VOLUME 36
NUMBER 2

FEBRUARY, 1949

plating

WIRE SCREEN PLATING

See Contents Page 135

There is a SPECIALIZED CLEPO COMPOUND for every Barrel Tumbling Process

Take advantage of our 15 years of Research and Development of Tumbling Methods.

CLEPO has pioneered the Development of Scientific Barrel Tumbling Compounds and Tumbling Mediums.

To obtain best results on Deburring and Burnishing write for information on our

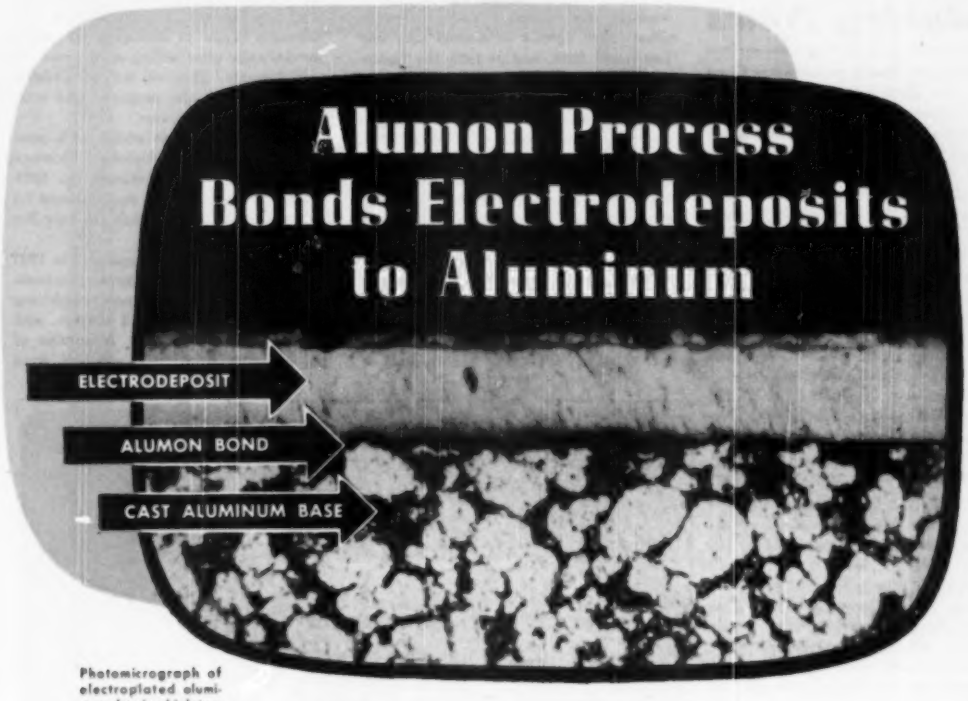
SPEE-D-BURR PROCESS.

FREDERICK **GUMM** *Chemical Company Inc.*

538 FOREST STREET, KEARNY, N.J.

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 72.

Alumon Process Bonds Electrodeposits to Aluminum



Photomicrograph of electroplated aluminum showing high tensile Alumon Bond.

Hundreds of manufacturers throughout the United States are now using electroplated aluminum. The Alumon process is simple. The work is merely cleaned, dipped in acid, dipped in Alumon and is then ready for electroplating with copper, nickel, and other metals. The process is suitable for plating most wrought and cast alloys . . . The cost of using alumon is low, being less than half a cent per square foot of surface area treated. The process can be fitted easily into regular plating cycles. Write today for Alumon Process bulletin and technical data on how you can use electroplated aluminum for your products.

Enthone INC.

442 Elm Street, New Haven, Conn.

Industry News

Washington Prepares Industry Controls. The National Security Resources Board, in preparing for any serious emergency, has during the last several months organized task groups of men from industry to review War Production Board orders and consider the type of organization best suited for their administration. Fred Carlson of American Tinning and Galvanizing Co. and Gustaf Soderberg, Editor of PLATING, were among the members of the group dealing with the zinc-cadmium industry. This work was completed at the end of 1948 and it was planned to submit the proposals to industry advisory committees for comments.

It should be emphasized that the preparation of these controls is purely precautionary and that there is no intention to use them except in the case of hostilities, which all hope won't materialize.

New York Job Shop Operations. According to the Monthly Bulletin of the Masters' Electroplating Association, 123 William Street, New York City 7, of which Adolph Bregman is the Executive Secretary, rate of operations among its members during November, 1948 had increased to 59 per cent as compared with 56 per cent during October, 1948. It is still below the rate for a year ago, 62 per cent.

The reports issued by the Association are interesting in another respect in that they indicate the average size of the reporting shops. During the week ending November 20, for example, the average man-hour capacity per shift was 1,364, which on the basis of a 40-hour week gives a capacity of 34 men. The average number of men actually working in each shop was about 21.

Diversey 25 Years Old. The Diversey Corporation, 53 W. Jackson Boulevard, Chicago 4, Ill., manufacturer of industrial chemicals—cleaning compounds, disinfectants, insecticides—signalized its 25th anniversary with the largest technical and engineering conference in its history held on December 13 to 17 in the Edgewater Beach Hotel, Chicago.

From small beginnings in 1923, Diversey has grown to the point where more than one hundred different products are marketed under the Diversey label. Beginning with two fieldmen, the sales organization now exceeds three hundred men.

Diversey set up shop in a one-room office near the Navy Pier, Chicago, in September, 1923, and a month later chalked up its first sale—a keg of Ampolite, and ammoniated cleaner for dishwashing and cleaning walls. Branch offices were opened in Kansas City and Detroit in 1924, and in 1925 the Executive offices were moved to larger quarters in the Lake Shore-Ohio Building.

Early salesmen could have outpointed the professional brawn and muscle boys, for their daily calls on customers required them to carry a "Boston bag" filled with twenty demonstration samples weighing a pound each. The idea was to use up all samples each day.

The development of Diversol in 1925, advancing as it did an entirely new concept of milk plant and dairy sanitation, established Diversey overnight as a major factor in this field. With the advent of this chlorine disinfectant old methods of disinfection by steam and hot water automatically became obsolete. At this time salesmen began to backtrack for purely service calls after selling a customer his initial supply. Thus was born the D-Man, the individual sales engineer who combines selling with service.

New products were added each year, including many electroplaters' cleaners, and Diversey "went national" in 1929. Sales training classes to equip D-men for selling and servicing the full Diversey line were inaugurated in 1933.

The company further expanded in 1937 with formation of The Diversey Corporation of Canada, Ltd., now employing more than fifty men and women, with headquarters in Toronto. A number of old line companies were acquired from

THE BEST PROTECTION AGAINST CORROSION COSTS LESS IN THE LONG RUN . . . . . .

TYGON

CORROSION-RESISTANT PLASTIC

PAINT

HALFWAY protection is worse than none where corrosion is a problem. Ordinary paints provide only a shield behind which corrosion goes on, uninterrupted. Be sure. Play safe. Protect your plant and its equipment with the paint proven over a 10-year period as the paint impervious to attack by most acids and alkalies.

Tygon *corrosion-resistant plastic* Paint is made of chemically inert plastics. It air dries quickly . . . forms a tough, durable, tight-adhering plastic film that *will not* support combustion . . . that *will* resist impact and chipping . . . that *will* provide effective protection against corrosive fumes and gases long past the life of even the best industrial paints.

Write today for your free copy of Bulletin 709.

RESISTS ACIDS, ALKALIES, WATER, ALCOHOL

NON-OXIDIZING, NON-FLAMMABLE, NON-TOXIC

EASILY APPLIED WITH SPRAY OR BRUSH, DRIES QUICKLY

U. S. STONEWARE

Akron 9, Ohio

MANUFACTURERS OF CORROSION RESISTANT MATERIALS & EQUIPMENT SINCE 1865

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ORDER YOUR

PLATING MATERIALS

FROM THE NEAREST

HARSHAW BRANCH

HARSHAW PLATING MATERIALS

- Nickel
- Chromium
- Cadmium
- Lead
- Tin
- Copper
- Zinc
- Silver

IN NEW YORK
420 Lexington Avenue

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505 North LaSalle Street

IN HOUSTON
Mellie Esperson Bldg.

IN PITTSBURGH
7th and Carson Streets

IN CLEVELAND
1945 East 97th Street

IN DETROIT
9240 Hubbell Avenue

IN PHILADELPHIA
117 South 17th Street

IN LOS ANGELES
609 S. Grand Avenue

IN CINCINNATI
611 American Bldg.

THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

SAM IS ABOUT TO

STRIKE OIL

Slipping accidents *will* happen — unless a regular program of prevention is enforced. You can carry out such a program, quickly and at low cost, with *Wyandotte Zorball**.

Zorball is the all-purpose floor absorbent that gives an immediate anti-skid surface to stained and soaked floors. It absorbs oil, water, paint, acids and other liquids that contribute to dangerous floor conditions. Slipping and fire hazards can then be literally "swept away."

Zorball is noninflammable. Even when saturated with oil, it resists burning. It will not break down and form "mud," either. It's harmless to fabrics, wood, metals, rubber and to the skin of those who handle it.

Safety calls for Zorball. Why not call your nearest Wyandotte Representative for details?

*Wyandotte Zorball is listed by Underwriters' Laboratories, Inc.

WYANDOTTE CHEMICALS CORPORATION
WYANDOTTE, MICHIGAN • Service Representatives in 88 Cities

Wyandotte
REG. U. S. PAT. OFF.

Industry News

time to time, their products being added to those bearing the Diversey label. Latest of these was the Enoz line of insecticides. The Enoz brand name will be fifty years old in 1949.

Diversey's headquarters have been in the Monadnock Building, Chicago, since 1926. Originally, only two offices were occupied. Today, the organization has all of one floor, and part of three others.

H. W. Kochs is chairman of the corporation, and L. Shere, president. W. E. Noyes is general sales manager.

Our congratulations!

Stutz New Bart-Messing Distributor. George A. Stutz Manufacturing Company of 1645 Carroll Avenue, Chicago, has signed as an official distributor of Sel-Rex Selenium Rectifiers, we are advised by Mr. M. M. Messing, president of Bart Messing Corporation.

The George A. Stutz Manufacturing Company is one of the oldest and largest supply firms serving the metal finishing industry. Its reputation as an organization marketing quality equipment is well known.

Pennsalt International Corporation, a newly formed subsidiary of Pennsylvania Salt Manufacturing Company, will take over the varied foreign interests of the parent company. Richard L. Davies is President of the new firm and John H. S. Barr is Vice President. Mr. Davies is Assistant to the President of the parent company for which Mr. Barr has been Export Manager since 1944.

Hammond Opens Los Angeles Office. To better serve the West Coast metal finishing industry, Hammond Machinery Builders, Inc., of Kalamazoo, Mich., has opened a new office at 1021 E. 8th Street, Los Angeles 21, Calif.

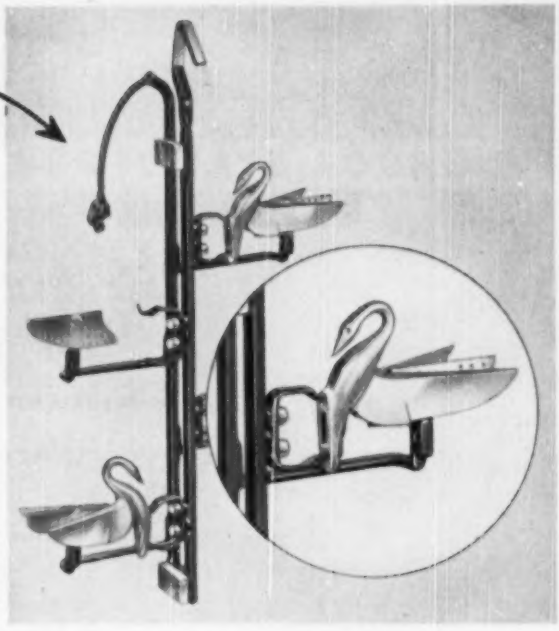
Mr. E. C. Hammett has been appointed western representative. His knowledge of metal finishing and of grinding and polishing machinery will prove to be of great value to the trade.

Film on Industrial Engineering. "Mighty Labors", a 16-mm sound and color motion picture, produced by Industrial Engineering College, Chicago, has just been released.

The film, which runs approximately 34 minutes, is the first to answer the question, "What is Industrial Engineering?", in a manner readily understood by the general public. It clearly illustrates and explains modern controls essential to economical production.

Assistance in producing the film was provided by twenty-four major business and industrial firms in the Chicago and Detroit areas. Included in this group were Marshall Field and Company, Carnegie Illinois Steel Corporation, Chrysler Corporation, and Zenith Radio Corpora-

$451.44 Saved per 1000 Pieces



Belke Rack with Auxiliary Anodes for Chromium Plating Automobile Radiator Ornaments. Tips are staggered to provide maximum capacity without shading. Specially designed spring pressure tips hold ornaments in correct relation to anodes, provide positive electrical contact, and permit fast racking and unracking. Tips contact only the non-critical area of the ornament. Lucite insulating blocks attach the anode spine to the cathode spine.

The Most Complete Plating Rack Manual Ever Produced

Developed by the World's Largest Manufacturer of Plating Racks

100 pages of experience-proved information. Practical construction methods. Modern Insulations. 560 Proven Designs of Racks, Tips and Hooks. 144 illustrations of Racking Methods—showing how to rack all shapes and sizes from jewelry to bumper bars. Price $5.00 postpaid.

BELKE RACK DESIGN Cuts Rejects 92½%

Here are the savings effected by BELKE Rack Design in chromium plating automobile radiator ornaments.

	Previous Racks	BELKE Racks
Rejects per 1000 pieces	285	21
Stripping and replating rejects—each	$ 1.71	$ 1.71
Cost of rejects—per 1000 pieces	$487.35	$35.91

You'll agree that a loss of $451.44 per 1000 pieces makes inefficient racks very costly to use. Yet this is but one example of what many plants are losing.

BELKE Design and Construction make the Big Difference

Correct Spacing of the Work, Correct Contact Tips, Correct Auxiliary Anode Arrangement, Correct Rack Materials, and Correct Insulation correctly applied.

As the World's Largest Plating Rack Manufacturer, BELKE Experience is unapproached. Knowledge of material and design, manufacturing Know-How, skilled personnel, and specialized equipment enable BELKE to give You Racks of highest efficiency for any plating requirement.

Prompt Delivery—Specialized Facilities and Production Line Technique give you BELKE Racks quicker than ever before.

Just send specifications with dimensional sketch or sample part for the BELKE Recommendation—or ask us to send a BELKE Service Engineer.

Belke MANUFACTURING CO.
947 North Cicero Ave.
Chicago 51, Ill.

EVERYTHING FOR PLATING PLANTS

Free: an important sample for barrel finishers

This free sample is valuable to every barrel finisher who wants to

1. Reduce tumbling time
2. Shorten the rinse time
3. Increase daily production
4. Reduce labor costs
5. Lower burnishing costs
6. Soften hard water

SPRODAMINE is the latest development in burnishing compound for barrel finishing of all ferrous and non-ferrous metals, alloy castings and platings of all types. SPRODAMINE is a combination of selected fats, wetting agents, and alkalis—and contains no soap. SPRODAMINE readily dissolves in cold water developing a pH slightly above neutral, thus producing a corrosion-free solution which will eliminate metallic soap deposits on the burnished pieces.

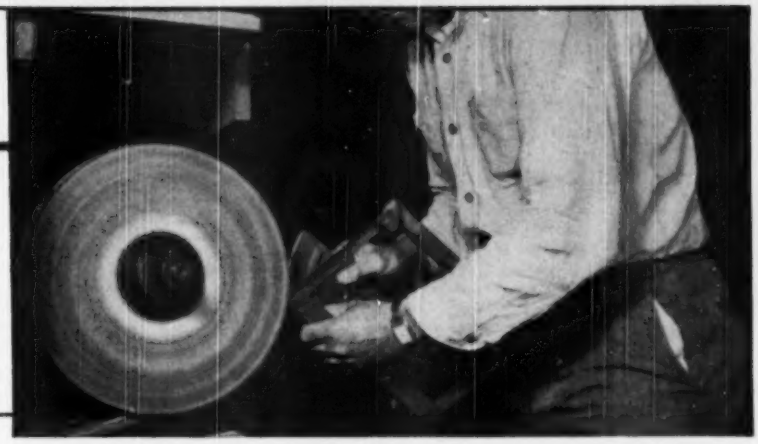
You will want to try the effect of SPRODAMINE's powerful cleansing, emulsifying and wetting-out properties in your own barrel. Use the Reader Service Card or write direct to us for your free sample.

SPECIALTY PRODUCTS CO.

190 WARREN STREET JERSEY CITY 2, N. J.

THE CASE OF THE FORTUNATE FOUNDRY

Finds a 28% boost in finish grinding air scoop flaps with



METALITE* CLOTH BELTS

When this shop converted from set-up wheels to the belt backstand method, interruptions in production were cut 'way down, one METALITE Cloth Belt outlasting four set-up wheels, permitting almost constant production, with time-out for belt change only one minute. The operation was finish grinding the outside edges of air scoop flaps — magnesium castings. DURABONDED METALITE Cloth Belts, #50-X grit, 12" x 118", were used over soft contact wheels, 16" x 2" x 1¼" rough edge — belt speed, 8500 SFPM. Output jumped to 60 per hour — 28% over the set-up wheel method formerly used, finish was better and costs were cut substantially.

You may find it profitable to check these findings against your production, with a demonstration in your plant of the belt method with METALITE Cloth Belts. Write, wire or 'phone us to arrange it.

GET THE COMPLETE SERIES

Our booklet "Production Talks Backstands" gives you a whole series of similar case histories with convincing facts and figures. Write for your copy today.

BEHR-MANNING

* Reg. U. S. Pat. Off.

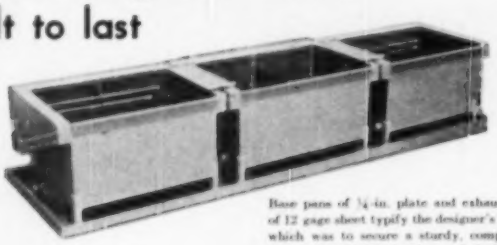
BEHR-MANNING · TROY, N.Y.

NORTON *abrasives*

THE BELT METHOD IS THE BETTER METHOD
. . . AND THE BETTER BELT IS METALITE

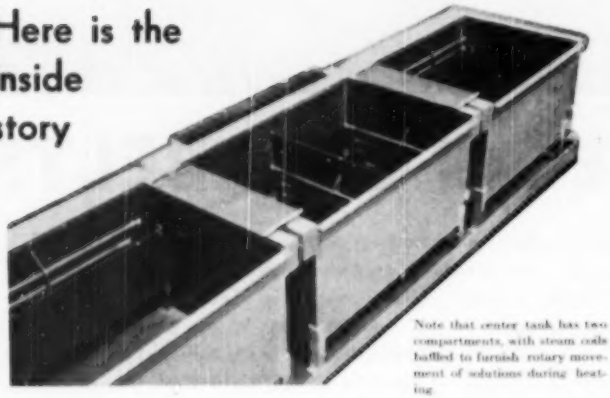
from the bottom up—

this cleaning tank unit is built to last



Base pans of ¼-in. plate and exhaust casings of 12 gage sheet typify the designer's objective, which was to secure a sturdy, compact, self-contained unit for cleaning and rinsing metal parts.

Here is the inside story



Note that center tank has two compartments, with steam coils baffled to furnish rotary movement of solutions during heating.

Base pan large enough to catch all drag-over and drips—and pitched for draining at one end—provides perfect leak-proof protection for lower floors. Steam coils are all Stortswelded construction. Exhaust casings, drafting at both ends and rear side, have slip joint connections to allow for one exhaust pipe to draft from all compartments. All seams and joints are Stortswelded for full strength and tightness.

When in need of new tanks or replacements, ask Storts engineers to help you plan for extended, trouble-free performance.

STORTS WELDING COMPANY
INCORPORATED
42 Stone Street Meriden, Conn.

Manufacturers of Welded Fabrications to Specifications

Industry News

tion. The film includeds ninety scenes made in the cooperating plants and three scenes taken in the laboratories of the College.

In demonstrating all phases of Time Study, Methods Engineering, Job Evaluation, Plant Layout, Process Charting, and Wage Incentives, the film clarifies the functions, principles and practices of the industrial engineering profession. It shows how the application of these techniques plays a vital role in bringing about a better way of life.

Prints of the film are available through the Industrial Engineering College, 3309 W. Washington Boulevard, Chicago 24, Ill. There is no charge for rental.

The 95th Meeting of the Electrochemical Society to be held on May 4 to 7 in Benjamin Franklin Hotel, Philadelphia, Pa., will have sessions devoted to Luminescence, Rare Metals, and Theoretical Electrochemistry.

Experienced man who knows plating field and can talk buffing composition, etc. Excellent opportunity for Northern Indiana, Ohio and Southern Michigan with leading midwest manufacturer. Supply all details in writing.

BOX P-2A, PLATING
P. O. Box 168, Jenkintown, Pa.

PLANT MANAGER,
PLASTIC PLATING

Ten years' complete charge large metal plating plant. Nine years' complete charge prominent plastic plating concern. Well versed in all finishes, barrel and still plating, installation, maintenance, production, etc. Developed various exclusive procedures and finishes. Wide trade acquaintance. *Reply to:*

BOX P-2B, PLATING
P. O. Box 168, Jenkintown, Pa.

HELP WANTED
INDUSTRIAL SALESMAN

National organization, selling quality products for 25th year, offers permanent sales positions with salary, commission, expenses. Industrial selling experience required. Knowledge of metal finishing processes such as electroplating, painting, metal cleaning, etc. desirable. Need men now living in Detroit, Cleveland, Chicago, Indianapolis, and area of Rockford, Illinois. Thorough training given at our expense. Must have car in good condition. Our men know of this advertisement. Write fully giving all educational and business details.

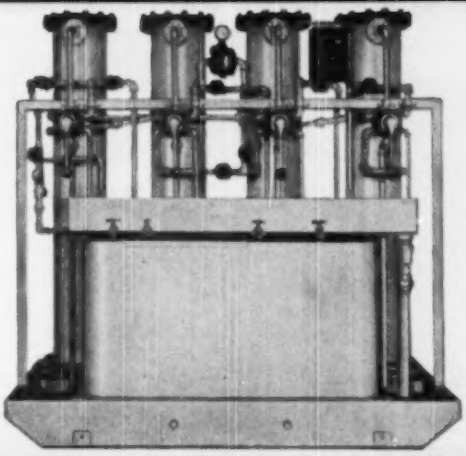
BOX P-2C, PLATING
P. O. Box 168, Jenkintown, Pa.

For

Water that leaves no stains after hot rinse

Water that causes no unwanted precipitates in solutions

INDUSTRIAL'S NEW ION EX DEMINERALIZERS



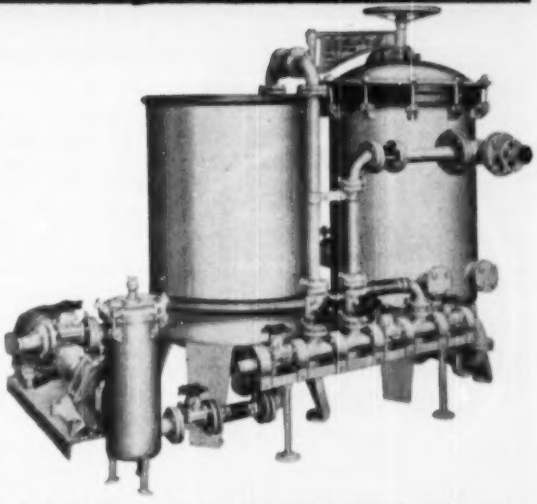
These ion-exchange demineralizers deliver the chemical equivalent of distilled water by simply passing water through ion-exchange resins. All dissolved mineral salts are removed without the use of any stills, heat, or steam. No cooling water is required and there are no scale formations. And the cost of this demineralized water is only a few cents per 1000 gallons compared to the several dollars for distilled water or steam condensate.

Model L-200 Four-Bed Industrial Water Demineralizer for a nominal flow rate of 200 gph. Other standard models available with capacities of 5 to 1000 gph. Special units of any capacity engineered to requirements.

For

Dependable Results in Solution Clarification

INDUSTRIAL'S FILTERS AND FILTERING SYSTEMS



In production filtration here are some points to check. Compare these construction and operating features of Industrial's filters.

Industrial's filters are conservatively rated on capacity. Compare the filtration area, the sludge holding capacity of the filter chamber, and the pump characteristics. All these factors govern the capacity of the filtering system. The filter cloths in connection with filter aids provide efficient, low-cost filtration in either continuous or intermittent service.

The air wash cleaning feature does not require any dismantling of the filter or removal of the cover. Industrial's filters have operated for months without opening—opening is required only for replacing filter cloths or for periodic inspection. This feature is a great time and labor saver.

A typical Industrial Stationary Filter System. Standard models—portable and stationary types—are available in capacities of 100 to 15,000 gph. Special filters are engineered to meet unusual requirements.

★ *Write for full information and recommendations*

FILTERS
Pressure Type

PUMPS
Centrifugal

CORROSION TESTING APPARATUS
Salt Fog
Humidity

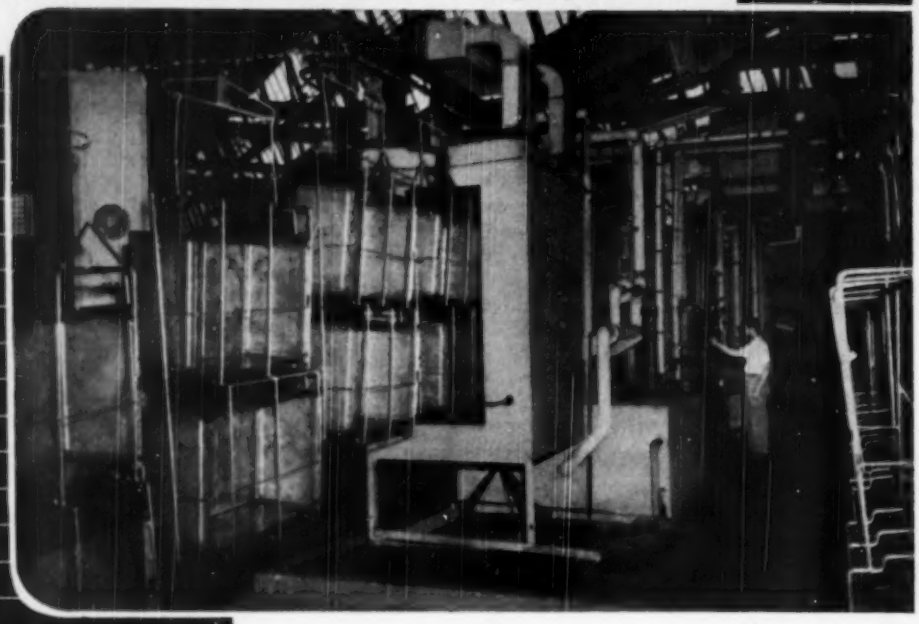
RUBBER DIVISION
Vulcanized Linings • Molded Products

ION EX DEMINERALIZERS

INDUSTRIAL FILTER & PUMP MFG. CO.

1623 West Carroll Avenue • Chicago 12, Illinois

NO REJECTS DUE TO CLEANING
in this large porcelain enameling operation



PENNSALT CLEANERS clean deep drawn cold-rolled steel refrigerator liners prior to porcelain enameling

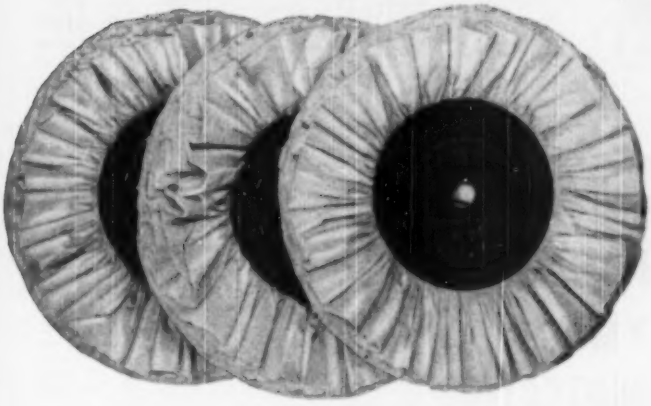
In this modern Eastern plant, producing refrigerators and home freezers, the porcelain enameling layout was especially designed to incorporate the latest equipment, including a 12-stage overhead conveyor-type spray washing machine.

Pennsalt Cleaners are used exclusively in this streamlined operation . . . in which parts can be on the way to assembly 1 hour and 45 minutes after they enter the washing machine. That calls for *efficient cleaning* . . . and efficient cleaning they get. In approximately a year, there have been *no rejects traceable to faulty cleaning.*

There are Pennsalt Cleaners for practically every type of metal cleaning. These products are concentrated, highly active, free-rinsing and long lasting. Pennsalt's technically trained representative will gladly study your set-up to see how Pennsalt Cleaners may give you better work at lower cost. Write to Special Chemicals Division, Pennsylvania Salt Manufacturing Company, Philadelphia 7, Pa.

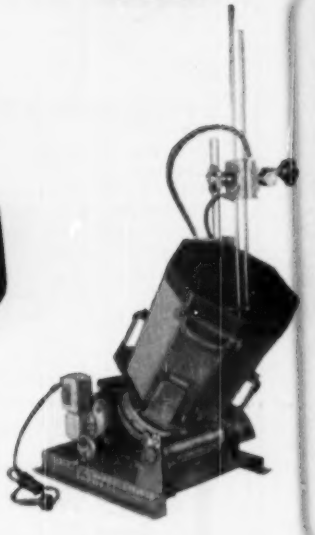
PENN SALT
METAL CLEANERS

RELIANCE PRODUCTS



NUWAY BUFFS

MANY FOLDS TO HOLD COMPOSITION USED FOR FAST CUTTING, FLAT AND ROUND SURFACE WORK.



EXTRUDED COMPOSITIONS

MORE COMPACT, NO LOSS FROM BREAKAGE
MORE ECONOMICAL.

RELIANCE MIDGET PLATING BARREL

TUB CAN BE LIFTED OUT FOR DUMPING AND TUMBLING BARREL INSERTED FOR TUMBLING INSTEAD OF PLATING—VERY RIGID—THREE SPEEDS.

USE READER SERVICE CARD: INDICATE A 63.

Chas. F. L'Hommedieu & Sons Co.

MANUFACTURERS of

Plating and Polishing Machinery

Complete Plating Plants Installed

C. B. Little
Newark, N. J.

W. R. Shields
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Philadelphia, Pa.

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4521 Ogden Ave.

CHICAGO

Branches:
Cleveland
and
Los Angeles

CHEMICALS
ACP
PROCESSES

Alodized
ALUMINUM
PROVIDES THE UTMOST IN METAL AND FINISH PROTECTION

A New Order of Durability

This aluminum panel was Alodized and then finished with one coat of white baking enamel. After **20,000 hours** of exposure to corrosive salt spray, the Alodized and painted aluminum is still in A-1 condition.

CHEMICALS ACP PROCESSES

RUST PROOFING AND PAINT BONDING
Granodine ®
Duradine ®
Rodine ®
Lubodine ®
Thermal Granodine ®

RUST REMOVING AND PREVENTING
Deoxidine ®
Peradine ®

PICKLING ACID INHIBITORS
Rodine ® ®

The Coating

"Alodine" produces a thin, tough, tight, skin-like coating firmly embedded in the aluminum. This protective skin is extremely resistant to corrosion and bonds paint firmly to the metal for the life of the finish.

The Process

Alodizing is simple, quick, economical, easy to operate and effective. "Alodine" can be applied by immersion, spraying, or brushing. It can be utilized to advantage in your own production. Write or or call for the new descriptive folder on "Alodine".

Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY

AMBLER, PA.

Manufacturers of Metallurgical, Agricultural and Pharmaceutical Chemicals

Personals

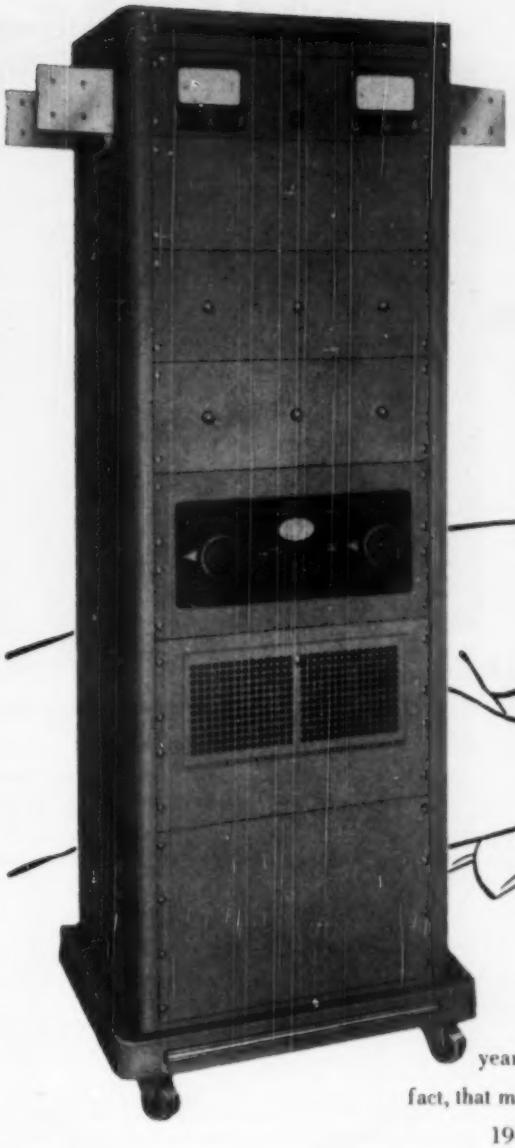
Dr. L. Yang, who recently was appointed the second Fellow on A. E. S. Research Project No. 6, "Nature and Effect of Porosity in Electrodeposits", under Dr. N. Thon at Princeton University, received his bachelor's degree from the National Central University in China, where he served for several years as lecturer on general chemistry. He has recently completed three years of research under G. I. Finch at the Applied Physical Chemistry Laboratory of Imperial College, University of London. His work there was a study of the growth and structure of electrodeposits by means of electron diffraction procedures, an admirable preparation for undertaking.

Dr. Harold J. Read has been appointed Chairman of the Publications Committee of the Electrochemical Society, succeeding **Mr. O. W. Storey.** Dr. Read is the Book Reviewer for PLATING and serves as Project Director for A. E. S. Research Project No. 7 on "Methods for Testing Thickness of Electrodeposits" which is being carried out at Pennsylvania State College where Dr. Read is Associate Professor of Metallurgy and Acting Chief of the Metallurgy Division.

George Morris, Bridgeport, Conn., has joined the sales force of the C. W. Haynes Laboratories, Inc., Springfield, Mass. He will cover the Southern Connecticut territory where he formerly represented the Egyptian Lacquer Manufacturing Company for over twenty years. An A. E. S. member for the same length of time, he is well known among platers as an amateur magician.

Dr. F. R. Morral has accepted an appointment as Associate Professor of Materials Engineering with the College of Applied Science of Syracuse University, Syracuse, N. Y. For several years Dr. Morral had been Group Leader of the Metal Trades Laboratory of the Technical Service and Development Division of American Cyanamid Company in the laboratories in Stamford, Conn.

G. B. Work has just been appointed Assistant General Manager of the Industrial Finishes Department of Atlas Powder Company. A native of Indiana, Mr. Work has been employed by a large manufacturer of finishing materials in Cleveland, Ohio since 1928 and was Industrial Sales Manager of its Finishes Division in Pennsylvania for ten years. He will make his headquarters at Stamford, Conn., but will work with both branches of the Industrial Finishes Department at North Chicago and Stamford which handle Zapon finishes.



how's your MEMORY?

Green Electric was the first to produce a selenium plating rectifier. Remember this old baby illustrated? It was one of the models designed over eight years ago. And it was pretty good — so good, in fact, that many of its features have been retained in our 1949 models. Which goes to show that when you do a thing right in the first place, you can't go wrong after that.

Do the right thing in the first place . . . specify Green first-place rectifiers.

Write for Selectro-Plater Book — 3rd Edition

W. GREEN ELECTRIC COMPANY, INC.

SELECTRO PLATERS AND ALL TYPES OF RECTIFIER EQUIPMENT

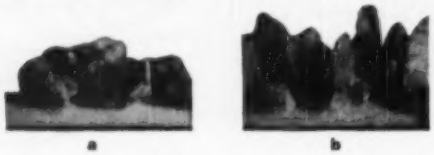
130 CEDAR STREET, NEW YORK 6, N. Y.

RECTIFIER ENGINEERS

FOR GRINDING, POLISHING AND FINISHING

—The Backstand-Belt Method has these five advantages...

The coated abrasive belt used in conjunction with contact wheel and backstand idler has been established as an efficient production tool. For grinding, polishing and finishing hundreds of consumer and industrial items, the backstand-belt method is more efficient and economical than the older set-up wheel method—because the backstand-belt has these five advantages over the set-up wheel . . .



a b

1. An abrasive belt is a scientifically made tool, manufactured under controlled atmospheric conditions by experts utilizing modern making equipment. The photomicrographs compare the crude, uncontrollable rolled-on cutting surface of (A) a typical set-up wheel with (B) the coating on an Armour Abrasive Belt. Note how the sharp cutting points on the factory coated belt are exposed to provide faster, cleaner cutting action . . . increased production.
2. The coated abrasive belt cuts cooler because of the longer interval between work contacts.
3. Inexperienced help can be quickly trained to operate a backstand-belt machine. Highly skilled personnel needed to dress the wheels can be used elsewhere.
4. It takes only a few seconds to change an abrasive belt.
5. Temperature-controlled room for curing set-up wheels can be released for other more productive uses.

Actually, there are more than five advantages to the backstand-belt method. If you are now using set-up wheels for your grinding, polishing and finishing operations, it will pay you to investigate this modern method. The coupon below is for your convenience in requesting the additional information contained in our new booklet—"Facts about Backstand-Belt Grinding and Polishing."

MAIL THIS COUPON TODAY

Please send me the booklet,
"Facts about Backstand-Belt Grinding and Polishing"

Name ..... *Title* .....

Firm .....

Address .....

City ..... *Zone* ..... *State* .....

Typical example—polishing and deburring time on stamped out surfaces improved 40%.

The McCaskey Register Company of Alliance, Ohio, a leading manufacturer of bookkeeping equipment, formerly used set-up wheels for polishing and deburring stamped out register covers. By switching to the backstand-belt method, production time for this operation was cut from one hour and 15 minutes per unit to 45 minutes per unit.

CASE HISTORY

This is a splendid example of what the backstand-belt method can do for you regardless of whether you are grinding, polishing or finishing flat or contoured surfaces, cast stamped or forged pieces.

PART. Cash register cases with fitted top cover.

MATERIAL. 18 gauge steel on cases, 20 gauge steel on covers. Both are deep draw stampings. They are given 3 draws and 2 anneals before polishing. The anneal is scale free as a result of being treated in a special atmospheric furnace.

PROBLEM. Polish flat surfaces after stamping and annealing. Debur fins resulting from stamped out portions of cases and covers.

PREVIOUS METHOD. Set-up wheels—grits 36, 60 and 100. Production with this method was 1 hour and 15 minutes for one case and cover.

SOLUTION. A Porter-Cable backstand unit is used in conjunction with a 16" medium hard, segmented felt contact wheel. The abrasive belts used are a No. 50 Armourclad Heavy Duty Alundum Cloth 2" wide x 168" long and No. 100 Armourclad Alundum Cloth 2" wide x 168" long running at the rate of 7000 SFPM.

RESULTS. It now takes only 45 minutes to polish and debur one case and cover. Intermediate sanding operation eliminated. Storage problem greatly decreased.

We recommend buying through your Industrial Distributor.

ARMOUR *Coated Abrasives*

ARMOUR AND COMPANY

1355 W. 31ST STREET • CHICAGO 9, ILLINOIS

NEW

ROHCO RESEARCH TAKES PARDONABLE PRIDE IN ANNOUNCING THE ARRIVAL OF ROHCO 20XL . . . OUTSTANDING CADMIUM BRIGHTENER FOR STILL AND BARREL PLATING!

IT'S NEW! IT'S REMARKABLE! IT'S ROHCO 20XL CADMIUM BRIGHTENER!

Cadmium scarcity in these days demands that platers produce the brightest and most efficient covering with Cadmium in the shortest possible plating time.

ROHCO 20XL represents an outstanding achievement in creating a heretofore unknown quality of Cadmium Brightness—resembling the brightest zinc—with an exceptional plating range. Brilliant deposits are produced *directly from the bath*, without a bright dip. Throwing power is so improved that many items now still plated may be barrel plated with ROHCO 20XL!

See For Yourself!

Send for ROHCO 20XL PRODUCTION PLATED SAMPLE for comparison—or, send us one-quart sample of your bath for easy conversion to ROHCO 20XL. No obligation.

R. O. HULL & CO., INC.
1277 WEST THIRD STREET
CLEVELAND 13, OHIO

ROHCO

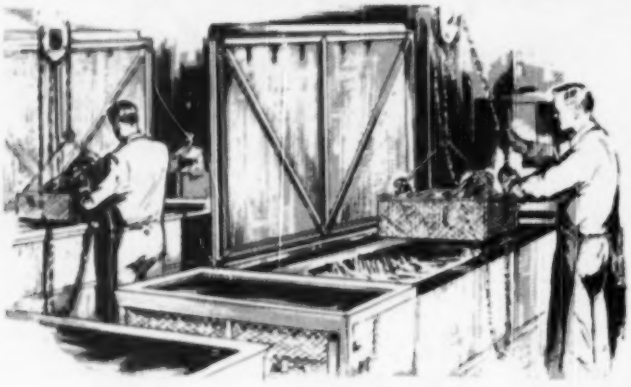
"YOUR PLATING IS BEST WITH THE HULL CELL TEST"

R. O. HULL & CO., INC.
1277 West Third Street
Cleveland 13, Ohio

Gentlemen:
Yes! Send—at once—ROHCO 20XL PRODUCTION PLATED SAMPLE.

NAME.....
COMPANY.....
ADDRESS.....

Put *Flexibility* into Your Metal Cleaning Plus Better Work at Much Lower Costs!



Magnus Aja-Dip Cleaning Machines

have shown that they clean faster, better and with less hand work in hundreds of metal cleaning installations. But you would be overlooking a tremendous additional advantage if you did not consider the greater *flexibility* of this type of *fast* batch cleaning and what it can mean to you in meeting changes in production schedules and unexpected cleaning jobs.

They clean fast, because the dynamic agitation of the up and down motion of the work IN the cleaning solution adds penetrating mechanical cleaning action to the chemical effects of the solution. They clean thoroughly, usually eliminating hand work, because dirts are removed from *all* surfaces, even those normally considered inaccessible. And because a batch is so quickly finished, the machine is virtually always ready for a new lot of metal parts and for any change in cleaning solution that may be required.

A Type and Size to Meet Your Needs

These sturdy, powerful machines are made in a range of capacities to cover any schedule, handling from 75 to 2200 lbs. per load of basketed or racked parts.

Can we help you work out a more flexible, speedy cleaning schedule?

MAGNUS CHEMICAL COMPANY • 41 South Ave., Garwood, N. J.

In Canada—Magnus Chemicals, Ltd., 4040 Rue Masson, Montreal 36, Que.

Service representatives in principal cities

IN METAL CLEANING IT'S **Magnus**

CLEANERS • EQUIPMENT • METHODS

Personals

Dr. William Blum has been appointed Assistant Chief of the Chemistry Division of the National Bureau of Standards, succeeding **Dr. Edward Wichers.** The latter in turn succeeded **Dr. C. E. F. Lundell** who recently retired from his post as Chief of the Division. Dr. Blum was featured as a leader in industry in the July, 1948 issue of PLATING.

L. K. Lindahl, President of The Udylite Corporation, was honored on his fiftieth birthday on December 2, 1948 by forty business associates and friends who met at the Detroit Golf Club.

"Lindy", as he is known to his many friends, was presented a beautiful ship's clock and barometer by the group. An-

other gift was a photograph album, bound in leather, which contained personal pictures and reproductions of press notices outlining his business and personal career from birth. These numerous pictures had been collected by Robert C. Trees, Advertising Manager of Udylite, from Mr. Lindahl's family and business associates throughout the country. One of the amusing incidents of the evening was the unveiling of a blow-up of one early picture showing Mr. Lindahl at the age of sixteen with his first pair of long pants.

At the Speaker's table, from left to right, are Mr. R. L. Spitzley, President of the R. L. Spitzley Heeting Company; W. M. Cornelius, Chairman of the Board of Parker Rustproof Company; C. H. Reeme, Vice-President and Treasurer of The Udylite Corporation; Mr. Lindahl; Mr. L. B. Nagle, Vice-President of Udylite, congratulating Mr. Lindahl; and Mr. E. R. Grace, Vice-President of Grant Advertising, Inc., Detroit, who acted as toastmaster.

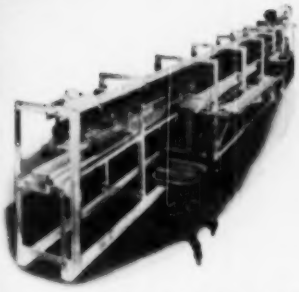
Dr. Fred E. Kendall has been appointed Vice-President and Director of Research and Sales of the International Rustproof Corporation, Cleveland, Ohio.

Dr. Kendall served as Chief Chemist in charge of electrochemical research for Republic Steel Corporation for several years. He has been active in the metal finishing industry and applied industrial research and development chemistry, and has devoted most of his time to related process-

MEAKER Electroplating Machines

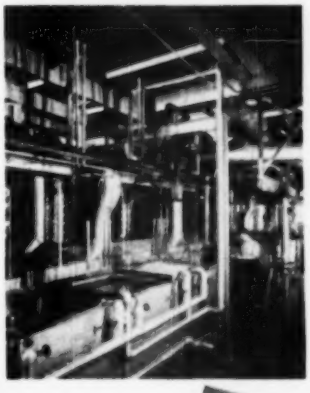
Tailored to Fit

Typical Meaker Straight-A-Way Automatic Machine. This machine was built for copperplating three rows of work simultaneously. It handles 125 racks per hour that are 16 inches wide, 14 inches thick, and 70 inches long.

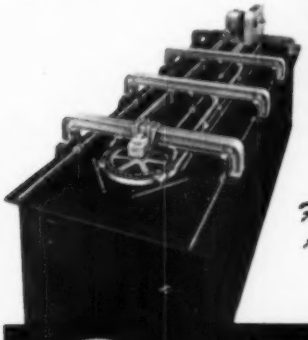


Meaker Special Machine designed for cleaning and silver plating small, brass contact clips. The unit is loaded at one point and the parts are carried through the operating sequence and automatically discharged into a container when completed.

Meaker Return-Type Automatic Machine for chromium plating the large variety of parts in a high-quality line of plumbing hardware.

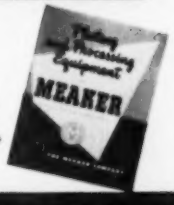


A Meaker Semi-Automatic Machine for use in medium-output plating departments. This type equipment is used in large, job plating plants to supplement the capacity of automatic machines.



Equipment tailored to fit your requirements, making every operation in the plating sequence automatic, or as mechanized as possible, is the profitable way to handle electroplating on a production basis. This Meaker method applies equally well to departments with only moderate daily output and to the largest and heaviest automatic plating needs of the mass production plants. It offers not only a lower unit cost, but the production is increased, and a better and more uniform quality of product is assured.

Write for the Full Information. Ask for Booklet No. 148 →



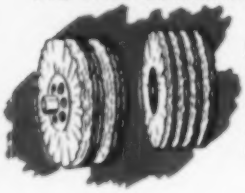
Serving the Plating Industry with the Best, Most Up-to-Date Equipment

THE MEAKER COMPANY

1629-41 South 55th Ave., Chicago 50, Illinois • Telephone CRawford 7-7202

A few questions answered about JACKSON AIRWAY *Ventilated* BUFFS

ARE THEY LOWER in COST per WHEEL? *Yes!*

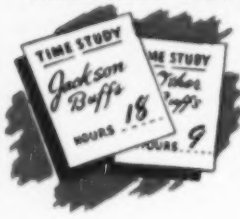


Because Jackson Airway *Ventilated* Buffs are twice as wide as ordinary buffs, you buy half as many sections per buffing wheel.

DO THEY BURN? *No!*

Jackson Airway *Ventilation* cools buffs internally . . . eliminates burning entirely even under severest operating conditions.

ARE THEY LONGER WEARING? *Yes!*



Time studies are offered as conclusive proof that Jackson Airway *Ventilated* Buffs wear twice as long as conventional buffs.

CAN THEY be USED at HIGHER SPEEDS? *Yes!*

Their patented construction eliminates burning, raveling and glazing at speeds 50% to 100% higher than with ordinary buffs.

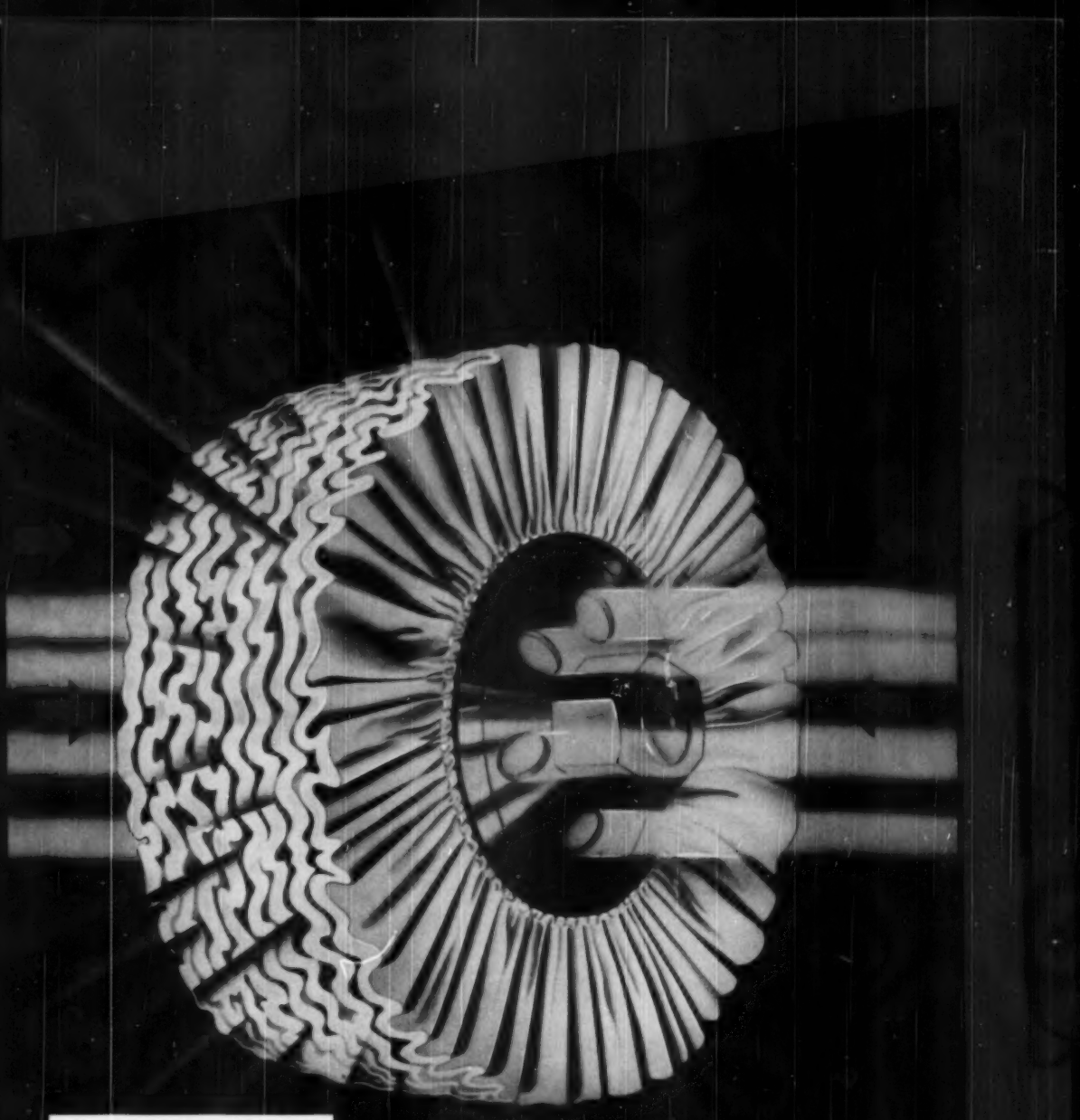
DO THEY SAVE COMPOUNDS? *Yes!*

Jackson Airway *Ventilation* keeps these buffs cool at all speeds—reduces the tendency of the compound to melt and be thrown off

IS THERE an AIRWAY BUFF for ALL PURPOSES? *Yes!*

There is a special Jackson Airway *Ventilated* Buff scientifically designed to do a specific buffing job on any material.

there is only **ONE** Jackson Airway *Ventilated* buff



WARNING NOTICE—Jackson Buff Corporation of Long Island City, N. Y., has rights to U. S. Patents Nos. Re 19,894 and 2,140,208 which have broad claims covering an air cooled buff having means for the admission of air through the sides of the buff. Owner intends to protect all rights and stop infringement.

JACKSON BUFF CORPORATION

33-03 FORTY-FIRST AVENUE • LONG ISLAND CITY 1, NEW YORK

Personals

ing problems. He was formerly a member of the chemistry staff at Western Reserve University, Cleveland, Ohio, and later Associate Professor of Chemistry at the University of Maryland.

William J. Nolan has been appointed Sales Manager of Maneely Chemical Company which opened a new $500,000 plant in Wheatland, Pa., on January 1. A Philadelphian with twenty-seven years' experience in the chemical business, Nolan, since graduating from Notre Dame, has worked for such firms as Grasselli, the General Dyestuff Corporation, Ellis Jackson and Company, Glidden Company, and for the past twelve years has had his own chemical brokerage business.

Frank L. Oldroyd is now Sales Manager of the Industrial Division of Oakite Products, Inc., New York City. He has been associated with the Oakite organization

Oldroyd

in the servicing of its industrial cleaning and allied materials for over fifteen years, having spent eleven of these years as an Oakite field service territorial representative in various sections of the country. Subsequent promotions found him acting in the capacity of Division Manager in the company's divisional offices in Atlanta and Chicago for a period of two and one-half years, then as special Field Sales Manager for a year prior to his most recent appointment.

R. M. Kaple, since 1945 Cleveland Division Manager for The Diversey Corporation, has been elected President of The Diversey Corporation of Canada, Ltd. He joined the company in 1939 as field representative.

Mr. Kaple's elevation to head of the Canadian company provided for advancement of three other men in the Cleveland Division. **R. L. Ware**, formerly District Manager, has been appointed Division Manager to take Mr. Kaple's place, and **J. M. McMurtry** and **R. W. Rafferty**, formerly senior salesmen, have moved ahead to district managerships.

Kaple

Ware

Mr. Ware joined Diversey in 1943 as a fieldman and was promoted to district manager in 1946. Before coming to Diversey, he was sales promotion manager for a large drug and candy manufacturer, and at another time general superintendent of a large chain organization. He attended Michigan State College. Mr. Rafferty began as a fieldman with Diversey in 1942. In 1946, he became a senior salesman. Prior to his association with Diversey, he supervised salesmen for an Ohio organization in the heating field. He attended Ohio State University. Mr. McMurtry joined Diversey in September, 1945. Less than a year later he became a senior salesman. Before becoming a member of the Diversey organization, he spent six years in sales training and advertising with a large Pittsburgh department store. He attended the University of Pittsburgh.

SPIN-DRIES SMALL PARTS *IN 2 MINUTES**

STANDARD MODEL KREIDER DRYER . . . Auxiliary gas or steam heating units available.

Pays for itself in time saved . . .

Dries Faster. Takes as *little* as 35 seconds to whirl parts completely dry—no more than 2 minutes for 50 pounds—drying basket (capacity 1140 cu. ins.) spinning at 625 rpm.

Dries Better. There's no marring or scarring with a Kreider Dryer. It produces smooth, evenly dried surfaces with longer lasting lustre.

Dries More Economically. Simple in design . . . rugged in construction, the Kreider Dryer is operated by one man. Uses less than one hp. Occupies less than 6 square feet floor space.

See for Yourself! Write today to Department PL 29 for an illustrated 4-page folder . . . also addresses of installations near you, where you can see a Kreider Dryer in action.

New Holland Machine Co., New Holland, Pa.

*Only 2 simple steps required . . .

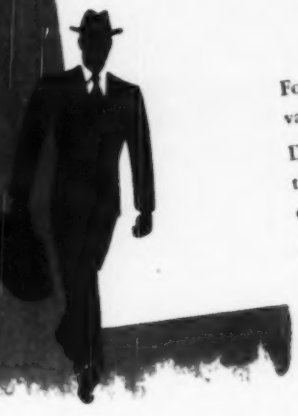
(1) Operator places wire mesh basketful of small parts in Dryer . . . turns motor "ON".

(2) Operator turns motor "OFF" . . . presses foot brake . . . removes basket.

NEW HOLLAND *KREIDER* DRYER

Cowles AP CLEANER

for SPEED and ECONOMY



For fast, scientific, economical cleaning of steel before various finishing operations, use Cowles AP Cleaner. Designed for use as a heavy-duty direct or reverse (cathodic or anodic) electrocleaner, AP has high current carrying capacity and blankets the electrolytic tank to prevent gassing.

It is an efficient soak type cleaner for the preparation of steel before pickling, electrogalvanizing, barrel plating, enameling and painting.

A trial drum will convince you.

Cowles Technical Service on Request

Cowles Chemical Company

METAL CLEANER DEPARTMENT • CLEVELAND 3, OHIO

SEYMOUR BEST SELLERS WORTH READING ABOUT

Here are the quick facts on the popular, industry-specified Seymour alloys. To product designers and production engineers interested in reducing costs, improving quality, increasing product acceptance, complete details on these widely used alloys are available in the NEW catalogs on Seymour Nickel Silver and Seymour Phosphor Bronze. Write for yours today.

SEYMOUR ALLOY NO.	COMPOSITION %					USES
NICKEL SILVER	NICKEL	COPPER	ZINC	LEAD	TIN	
● 18A1	18	65	17			Seymour Nickel Silver is used for flatware, hollowware, name plates, surgical appliances, drafting instruments, camera parts, springs, electrical resistance units, optical goods, television parts, slide fasteners, costume jewelry, dental instruments, architectural trim, core bars, screws, keys, screw machine and milled products, orthopedic appliances, telephone assemblies, diaphragms, ornamentation and hundreds of other uses.
● 18A4	18	55	27			
● 18X1	18	62	19	1		
● 15A	15	64	21			
● 15X1	15	60	24	1		
● 15X2	15	60	23	2		
● 12A1	12	66	22			
● 12X1	12	60	27	1		
● 12X2	12	60	26	2		
● 10A1	10	67	23			
● 10X1	10	60	29	1		
● 10X2	10	60	28	2		
● 5A1	5	68	27			
PHOSPHOR BRONZE						
● 950		95			5	Seymour Phosphor Bronze is used for springs, diaphragms, fuse clips, lock washers, thermostatic controls, studs, microphone assemblies, electrical devices, nuts, bolts, gears, bushings, pump parts, pinions, plugs, etc.
● 494		94		1	5	
● 928		92			8	
● 910		90			10	
● 444		88	4	4	4	

OTHER SEYMOUR PRODUCTS

Seymour Nickel Anodes are produced under accurate pyrometric control. Special grain structure reduces sludge and loose nickel to a minimum. Seymour Anodes, in all shapes to meet rigid specifications, are also available in copper, brass, bronze and zinc.

Seymour Bright Nickel produces bright deposits over copper and brass and direct on steel without the usual coloring and buffing.

Seymour Phosphor Bronze Welding Rods are made specifically for high strength, ductile welds. Available in standard lengths, Grades A, C and D.

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2800 South 61st Court, Cicero 50, Ill.
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WILLIAMS & COMPANY, Inc.
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3700 Perkins Avenue, Cleveland 14, Ohio
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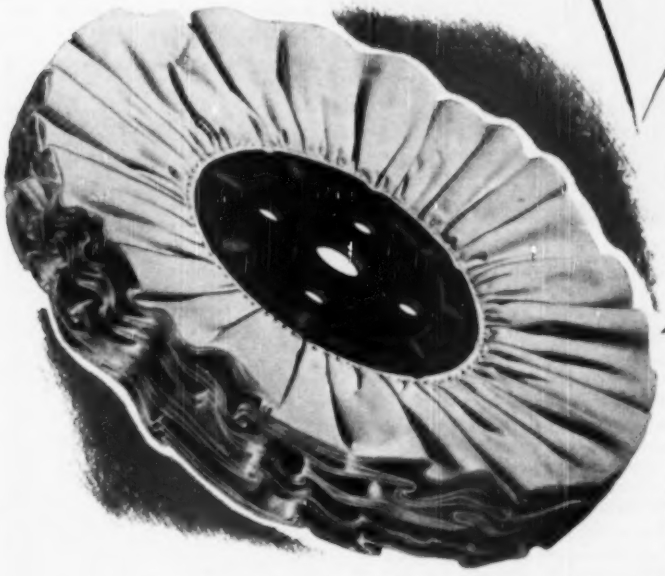
THE SEYMOUR MANUFACTURING COMPANY, SEYMOUR, CONNECTICUT

We are realizing Greater Production- and GREATER PROFITS- now that we are using CODMAN'S REAL-VENT Ventilated Non-Fray BUFFS

GOOD BUFFING JOBS — done faster — with buffs that will stand up longer at high or low speeds — is the goal of all practical finishers. CODMAN'S "REAL-VENT BUFF (either open, or closed face), with its revolutionary thin-pressed center and non-compressible ventilating channels, is the hard working profit-maker that is making this goal possible. Write for details, today.



CODMAN'S REAL-VENT Ventilated Non-Fray buff is made under patent Nos. 2,027,063; 2,094,650; 1,573,961; Re 19,894; 2,146,208. Other patents pending.

THE MARK OF QUALITY

For Over 50 Years the Greatest Name in Buffs

BUFFING AND POLISHING WHEELS FOR EVERY OPERATION

F.L.&J.C. CODMAN COMPANY ROCKLAND - MASSACHUSETTS

BRANCH OFFICES DETROIT LOS ANGELES PHILADELPHIA GRAND RAPIDS

The Mailbox

Subject: Buffed Finish on Stainless Steel by Tumbling

DEAR SIR:

In his informative article in the November, 1948 issue of PLATING, "Surface Finishing of Stainless Steels", K. M. Huston states: "Wet tumbling procedures are considered effective. A final finish approaching that of a buffed finish may be obtained by the proper selection of abrasive, speed of rotation, and time". Leroy Beaver, in the November, 1948 issue of *Products Finishing*, reports his experience as follows: "Since 'color' and not 'finish' is the point at which most of you are aiming, we can tell you that any 'color' you obtain through a barrel finishing operation will be generally dull for the stainless steels as compared with the color secured by a like procedure on straight carbon steels . . . A like procedure on any of the stainless steels will produce a dull blue or bluish gray cast".

It would be of considerable assistance if Mr. Huston would give the procedure required to obtain smoothness and color similar to that which can be obtained on carbon steel.

Yours truly,
GEORGE B. HOGABOOM

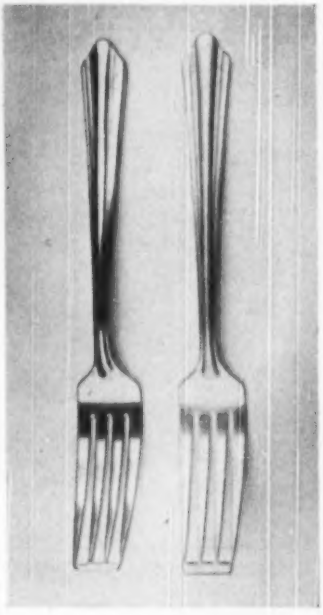
DEAR SIR:

Some time ago we had ¾-inch diameter x 5-inch long centerless ground samples of Types 410, 416, 430, 430F, 431, 303 (S), 303 (Se), and 304 stainless steel wet-tumbled by the Minnesota Mining and Manufacturing Company for an atmospheric corrosion investigation we are conducting to study the effect of surface finish on corrosion resistance. The finish obtained by tumbling for 16 hours in No. 4 Super-Honite mixed with 2 pounds No. 1 Honite compound and 4 gallons water in an octagonal barrel (30 inches across the flats) operating at 15 rpm compared favorably with corresponding centerless ground samples finished first on a 10-inch sewed buff at 5800 sfm loaded with 240-grit emery polishing grease and then on a 12-inch loose buff at 7000 sfm loaded with unfused aluminum oxide (white chrome).

After one year's exposure, there was no significant difference in the corrosion resistance of the polished and tumbled samples.

We have also seen samples of wet-tumbled parts blanked from stainless steel strip with a 2B finish that had a final finish approaching that of buffed parts.

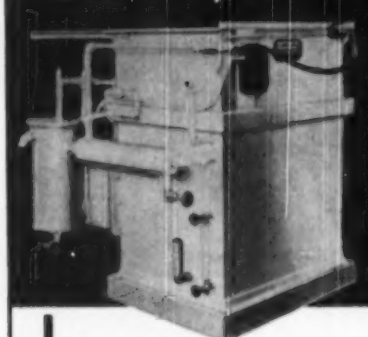
We feel the proper selection of abrasive, speed of rotation, and time will produce a final wet-tumbled finish on stainless steel which approaches the smooth finish of high color produced by ordinary wheel buffing. The color obtained by wet-tumbling depends on the technique required for the individual part. At its worst, it will only be slightly darker than that obtained by buffing. There is very little difference in luster and color between stainless steel and carbon steel that have been properly finished by tumbling.



The enclosed picture illustrates what can be accomplished by wet-tumbling. The tumbled sample is on the left, the as-stamped sample on the right.

Cordially yours,
KENNETH M. HUSTON

Clean your metal parts at a new low cost with an **OPTIMUS Vapor Degreaser**



In these days of mounting production costs you cannot afford to take chances with old obsolete methods. Especially when you can maintain improved production and better finish—with the use of an OPTIMUS Vapor Degreaser.

With an OPTIMUS Degreaser the degreasing operation is quick, parts emerge clean and dry, ready for further processing, such as painting, plating, lacquering, enameling, rustproofing, heat treating, assembling, welding, anodizing or fabrication.

OPTIMUS Degreasers may be used with the simple vapor phase by itself or in combination with dip, immersion or rinsing operations. A power spray rinse or flush can also be utilized to remove stubborn deposits and insoluble particles such as chips and other foreign matter.

Whatever your metal parts cleaning requirement there's either a standard or special model OPTIMUS Degreaser to meet your needs. Write today for new general catalog.

OPTIMUS EQUIPMENT COMPANY
13 Water Street Matawan, N. J.
Offices in principal cities

OPTIMUS EQUIPMENT
FOR CLEANING · RINSING · DEGREASING · PICKLING AND DRYING OF METAL PARTS

99-ZINC

gives improved

- CURRENT DENSITY
- PLATING RANGE
- EFFICIENCY

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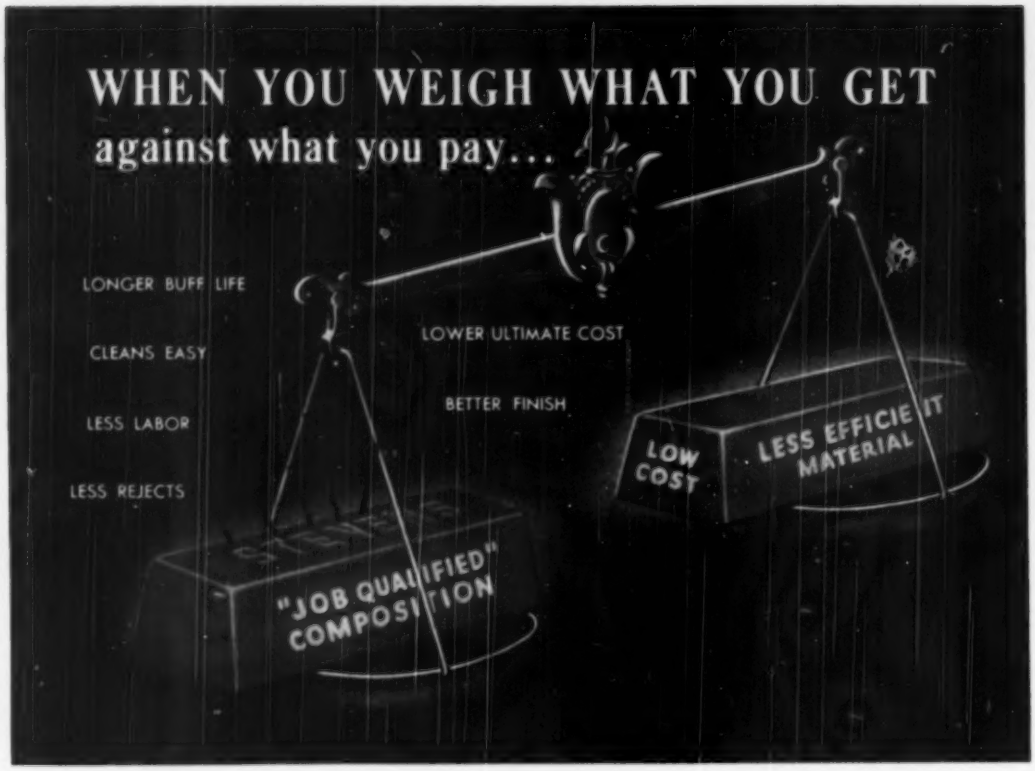

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The cover picture of two plating machines for wire screen, is part of a story on page 142 about the manufacture, plating and painting of such screen by the Hanover Wire Cloth Company.

Abstracted regularly in Chemical Abstracts, Engineering Index, Technical Data Digest and Bulletin Analytique.

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plating

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Editorial

Food for thought

NOW AND THEN an editor must sit back and ponder the functions of the journal he edits. Here are some of this editor's ruminations.

A technical journal is somewhat like a restaurant to which people come at regular intervals to be fed (except that the journal obligingly goes to the customers). The contributors are the cooks, and the editor is the smiling manager who sees to it that the restaurant is attractive and the customers are served in a nice manner, just what they want. That sounds like an ideal simile until the editor remembers that most people want to eat their favorite food, cooked in precisely the way to which they are accustomed, and as a rule do not want to experiment. The question arises: Is that also true of the reading habits of the average reader of a technical journal? Does he want to be served the same old fare with which he is so familiar and which permits him to nod his head approvingly and say, "That's right"? Does the human mind *like* to run in old channels worn smooth with continuous use or does it like to make the necessary effort to cut new canals through the wilderness?

The answer is evidently that some minds are lazy, others are not. The technical journal certainly cannot cater to the former and at the same time succeed in serving the latter. New things are being developed all the time and there are always new viewpoints being applied to old facts. The editor must see to it that the new things and new ideas get to the enterprising reader who both wants and needs them.

But if he does, there is not much room for old things or old ideas, and they do have their place. The young man who just entered the field needs a great deal of the old if he is going to assimilate the new. Should not consideration be given to him? This time the answer must be yes with a but, because the responsibility must in the nature of things be placed on the book publisher, not the journal editor. The very purpose of technical books is to present the old, relatively speaking, in a systematic manner which can never be accomplished in a journal. And, fortunately, there are several excellent textbooks and handbooks in the plating field.

The editor has also pondered the problems that confront him because of the readers' various interests and educational backgrounds, but they must be left to a future issue.

Gustaf Soderberg

HIGH SPEED AUTOMATIC NICKEL PLATING

with notes on rainbow in chromium plating and on electropolishing of S. A. E. 1010 steel

ALBERT HIRSCH

Electroplater and Chemist, Snyder Manufacturing Company
Philadelphia, Pa.

OUR FIRST EXPERIENCE with bright nickel coatings goes back to September, 1945 when we installed a small 230-gallon rubber-lined steel tank with the Udylite No. 31 nickel bath.* Since equipment was difficult to get at that time, the tank was operated without moving cathode rod or any other kind of agitation. It was run for 1½ years, producing bright deposits, before the first filtration.

As a result of this experience four additional tanks were installed: two 800-gallon tanks with moving cathode rods and two 350-gallon tanks without agitation, giving us a total of over 2500 gallons of bright nickel solution. These tanks had a capacity for plating 2000 grille guards in an 8-hour day, a total area of approximately 2000 square feet. The required 0.001 inch thick nickel plate was deposited in ½ hour at about 40 asf with a bath temperature of 140° F. The operating cycle was as follows: cathodic alkaline cleaning, cold rinse, cathodic pickling in cold 10 per cent sulfuric acid, cold rinse, cyanide copper strike at 130–140° F, cold rinse, dip in 10 per cent muriatic acid, cold rinse, nickel plate. The article was then reracked for chromium plating. The whole cycle was operated manually.

Early Work With a High-Chloride Bath

While we were thus gathering experience with bright nickel plating, experiments were carried out in the laboratory with the high-speed nickel bath proposed by Pinner and Kinnaman.[1] This solution contained

Nickel sulfate	27 oz/gal (200 g/l)
Nickel chloride	23 oz/gal (175 g/l)
Boric acid	5.3 oz/gal (40 g/l)
Brighteners*	

Having verified Pinner's result, we made up a small 60-gallon tank with the high-chloride bath. In it we could bright nickel plate at 140° F with current densities of 75 asf, almost twice what we could use in the No. 31 bath in the production tanks. A 15-minute plating time gave us a thickness of 0.001 inch. The bright plate also had a considerably higher luster than that produced in the regular bright nickel solution. On the basis of these results we converted one of the 800-gallon tanks to the above-mentioned high-chloride formula.

Glass Heating Coils

Realizing that a lead heating coil would corrode in this high-chloride bath, we started to experiment with glass coils. In the beginning difficulties were encountered with coil breakage, but the supplier† soon learned how to anneal the glass so as to reduce its brittleness. There remained another difficulty in that the glass coil was still not strong enough to withstand the hammer action which occurred when the steam was turned on, in the beginning of the working day or by the action of the automatic temperature controller. This difficulty was overcome by placing a Nicholson Automatic Valve‡ at the highest point of the glass coil. By letting out all air and then closing when the steam arrives, the valve prevents the hammer action. With these improvements and using ordinary care in preventing anodes or articles from hitting the coils we have now operated with glass coils for over a year without breakage.

Glass coils have been installed also in our chromium plating tank which is lead and brick lined. Being non-metallic they are not subject to stray currents and do not suffer corrosion.

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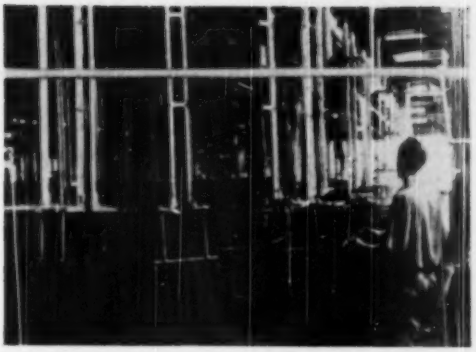
*Manufactured by The Udylite Corporation, Detroit, Mich. W. H. Nicholson and Company, Wilkes Barre, Pa. †Charles K. Porter Company, Hatboro, Pa. ‡Manufacturer,



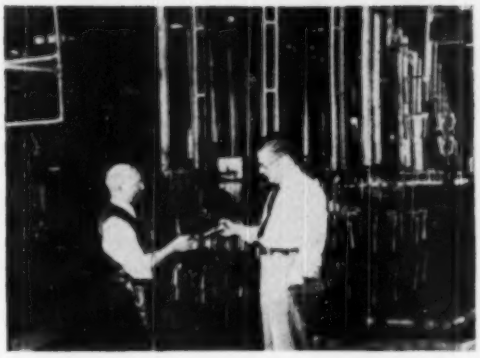


Fig. 1. Two views of full-automatic plating machine seen from loading end: top view while plating aerial tubes, bottom view while plating exhaust extensions (author at left; R. Morris, Sales Manager, at right)

Full-Automatic Operation

To take care of increased production a full-automatic plating conveyor was installed; it was ready for operation in August, 1947. This conveyor was originally designed to copper-nickel-chromium plate aerial tubes of admiralty brass and has a capacity of 2000 tubes per hour (Fig. 1, left). The cycle included cathodic alkaline cleaning, anodic alkaline cleaning, warm water rinse, cold water spray rinse, 5 per cent by volume muriatic acid dip, cold water rinse, cyanide copper strike, warm water rinse, cold water spray rinse, 5 per cent by volume muriatic acid dip, cold water rinse, bright nickel plate in No. 31 solution to deposit 0.00025 inch coating, two cold water spray rinses, chromium plate, three warm rinses, steam drying. A complete cycle for the aerial tubes was 20 minutes.

It soon became necessary to use the same full-automatic for plating exhaust extensions made of steel. For this purpose two hand-operated alkaline cleaning tanks were placed on the side of the full-automatic machine and filled with suitable steel cleaners, the first being operated cathodically and the second anodically. All steel parts are taken through these hand-operated tanks and then hung in the first rinse tank on the full-automatic; the brass parts still use the cleaners in the automatic machine.

Following the experimental work described below, the Udylite No. 31-H bright nickel bath, which is also a high-chloride bath, was substituted for the No. 31 nickel bath. With it 0.001 inch of nickel can be deposited on the steel in 14 minutes, giving a total conveyor cycle time of 70 minutes. At this rate we plate 3200 exhaust extensions with copper, nickel and chromium in an 8-hour day. Some parts require less plate and for them the cycle time is proportionally shorter.

Additional Experimental Work with a High-Chloride Bath

Before we put the No. 31-H bath into the full-automatic, we ran a series of tests in the laboratory in a small rubber-lined steel tank of 12-gallon capacity.

The No. 31-H bath consists of

Nickel chloride	27 oz/gal (200 g/l)
Nickel sulfate	12 oz/gal (90 g/l)
Boric acid	5 oz/gal (38 g/l)
Brightener*	

A number of the exhaust extensions shown in Fig. 2 were plated in this small solution and compared with the same items as plated in the No. 31 bath on the conveyor. A comparison of the attainable cathode current densities is shown in Table I. In these tests the parts in the experimental bath were plated with hand agitation on the cathode bar, all other

TABLE I. CURRENT DENSITIES OBTAINED ON PLATING EXHAUST EXTENSIONS IN REGULAR BRIGHT NICKEL BATH IN FULL-AUTOMATIC AND IN HIGH-CHLORIDE BRIGHT NICKEL BATH IN EXPERIMENTAL TANK

Temperature 140° F, tank voltage 6 volts, time 10 minutes
Work in experimental tank agitated by hand

Exhaust Extension No.	Current Density, asf		Current Density Increase %
	Regular Bath	High-Chloride Bath	
215	32	80	150
213	33	70	110
212	50	100	100
210	55	110	100

*Manufactured by The Udylite Corporation, Detroit, Mich.

conditions being equal to the conditions in the full-automatic machine. In addition to the doubling of the attainable speed of plating we found that the deposits from the high-speed baths were fully as ductile as those from the low-speed bath and considerably more lustrous. The result was the previously reported change-over in the full-automatic machine.

Rainbow in Chromium Plating

It is well known that successful chromium plating requires that each tank load of parts be of the same general shape and area. Schneidewind[2], in 1930, stated, "It is highly undesirable to plate several objects of different sizes and shapes in a chromium tank at one time if it is expected to keep rejects due to poor plating under five per cent. For example, although it may be possible to plate a rack of screws, a radiator shell and a hub cap simultaneously in a large tank, it is likely that during a day's run under these conditions the percentage of rejects would be excessive".

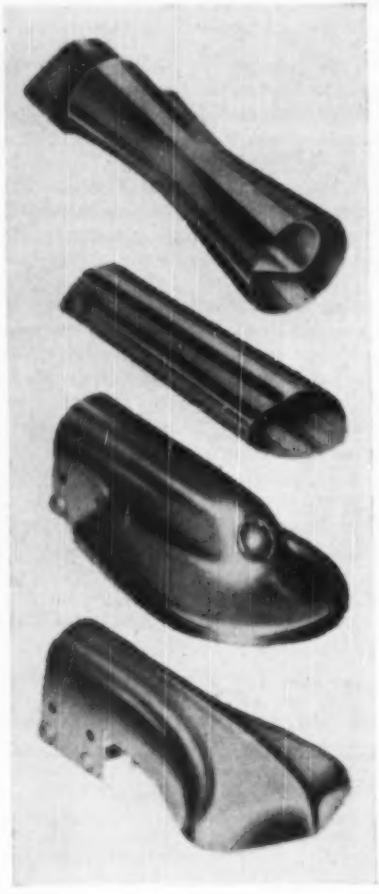


Fig. 2. Exhaust extensions used in experimental work. From top to bottom, Nos. 215, 213, 212 and 210

However, difficulties may be encountered in a full automatic even if the different parts are rather similar. For example, when a single rack holding the four exhaust extensions shown in Fig. 2 was plated in the full automatic together with other racks with exhaust extensions, every part on the single rack showed rainbow colors all over.

An investigation of this perplexing situation* demonstrated that the causes for rainbow could be many. One requirement was that the parts make electrical contact just before they enter the chromium plating bath in the automatic machine. Another requirement was that the rack members have ample current carrying capacity; if they do not, they cause local overheating of the plating solution which, without compensating increase in current density, causes rainbow colors to appear. The same effect is had when contacts are loose or dirty. The regular automatic control of bath temperature does not help this particular situation.

Careful choice of operating conditions, however, proved to be helpful. After considerable experimenting we found the least tendency to rainbow when the chromic acid-sulfate ratio was 130 to 1, the bath temperature 113 to 120° F, and the current density 150 asf.

Electropolishing of S. A. E. 1010 Steel

Since our facilities for hand polishing of steel parts are inadequate, we have done a great deal of work on the electropolishing of S. A. E. 1010 steel with a No. 2 finish using the sulfuric-phosphoric acid type electrolyte. Most of the work has been done with the No. 210 exhaust extensions (Fig. 2) and the tests have been carried out all the way up to a 500-gallon tank scale. Best results were obtained at electropolishing current densities of 110–120 asf using the aforementioned type bath at 200° F, which requires a tank voltage of 12 to 15 volts with the load that we were carrying in the large tank. Under these conditions a very excellent finish was had as long as the parts were made of a *good* grade of steel. The final luster after bright nickel and chromium plating was considerably higher than when the exhaust extension had been hand polished.

If we could be assured of a continuous supply of a good clean steel, I would not hesitate to include the electropolishing in a full-automatic cycle. Our experience has shown that it is only necessary to degrease the low-carbon steel parts in a solvent degreaser before they are put into the electroplating bath and that all that is needed after electropolishing is thorough rinsing

(Continued on page 176)

*With the assistance of Mr. H. L. Pinkerton, Graham, Crowley and Associates, Inc., Jenkintown, Pa.

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OLIVER P. WATTS

THE NAME OF DR. OLIVER P. WATTS, although the bearer has been in retirement for a number of years, is still one to be counted with, appearing as it does in every issue of every plating journal.

Dr. Watts was born in the old shipbuilding town of Thomaston, Maine, July 16, 1865. Graduated from Bowdoin College in 1889, he studied for a year at the newly opened Clark University in Worcester, Massachusetts—the first university in the United States for graduate students only. He then served as grammar school principal for two years, and taught physics, chemistry and mathematics at Franklin Academy in Malone, New York, and high school chemistry in Waltham, Massachusetts, for a total of eleven years.

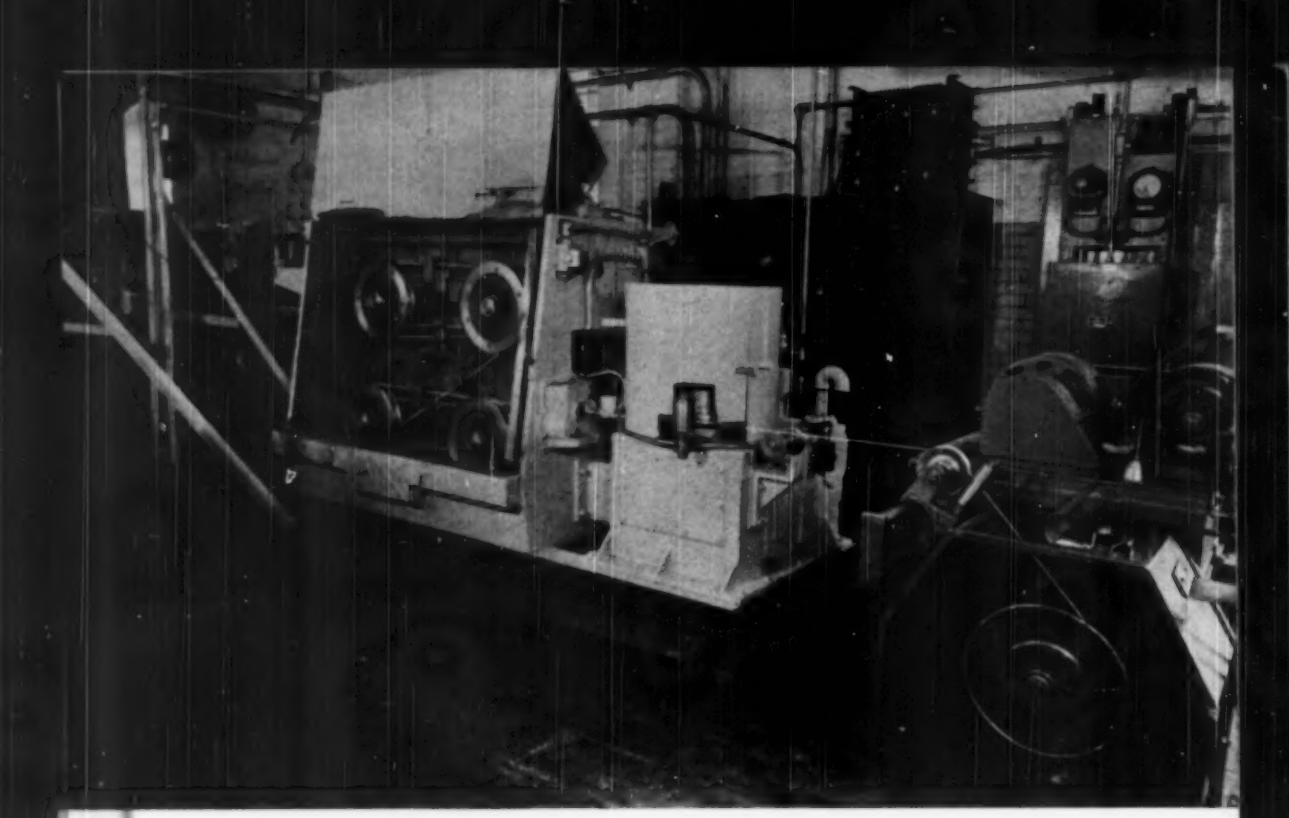
When Waltham acquired a new high school building, a motor-generator set and a storage battery was installed so that experiments in electrolysis could be performed by students. Having this equipment, the next thing was to learn its effective use. Inquiry led to the conclusion that the best place to study electrochemistry was the University of Wisconsin where Louis Kahlenberg taught theoretical and C. F. Burgess applied electrochemistry. Dr. Watts was granted a year's leave of absence and departed for Madison—never to return. He received his Ph.D. degree in 1905.

At this time Prof. Burgess obtained a grant from the Carnegie Institution to study the properties of iron alloys. The first requisite was to obtain pure iron, and Dr. Watts was hired to carry out the electrolytic refining. Stoneware tanks were built, with connections for circulating and filtering the solution of ferrous sulfate, wrought iron anodes and thin sheet iron cathodes were put in place, and electric current passed twenty-four hours a day. Since the deposited iron was highly brittle, it could be deposited on iron starting sheets, and when a convenient thickness of $\frac{3}{8}$ to $\frac{1}{2}$ inch was attained the cathodes were removed, and the electrolytic iron was broken off by hammering.

When in the fall of 1906 there was a vacancy on the chemical engineering faculty, Dr. Watts became instructor in electrochemistry. He later became professor and continued as head of the department until he passed the age limit of seventy in 1935.

The most important of his fifty-nine papers on plating and corrosion is probably "Rapid Nickel Plating", presented before the Electrochemical Society in 1915. In this he recommended substitution of the single sulfate of nickel instead of the double sulfate of nickel and ammonium previously used. The higher concentration of nickel thus made available in the nickel bath permitted a great increase in the speed of nickel plating and is the basis for all modern nickel baths. Of about equal importance was his Rochelle salt copper cyanide bath, still widely used.

Our best wishes go to this pioneer in the electroplating field who will always remain one of the great leaders of the industry.



Large wire drawing machine reduces ¼-inch wire to 0.045 inch by means of 12 carboloy dies. The reduced wire is coiled at right by means of the special coiling mechanism

WIRE SCREEN PLATING

. . . an example of processing continuous lengths of material

THE CENTER of wire screen weaving in the United States, peculiarly enough, is located in York County, Pa., one of the richest agricultural areas of the country. Here seven companies produce not less than 68 per cent of all the wire screen manufactured in the country.

One of these, in the town of Hanover, is the Hanover Wire Cloth Company, now a division of Continental Copper and Steel Industries Inc. This company was organized in 1903 to manufacture bronze wire screen in an old plant which originally housed a match factory and a shirt factory.

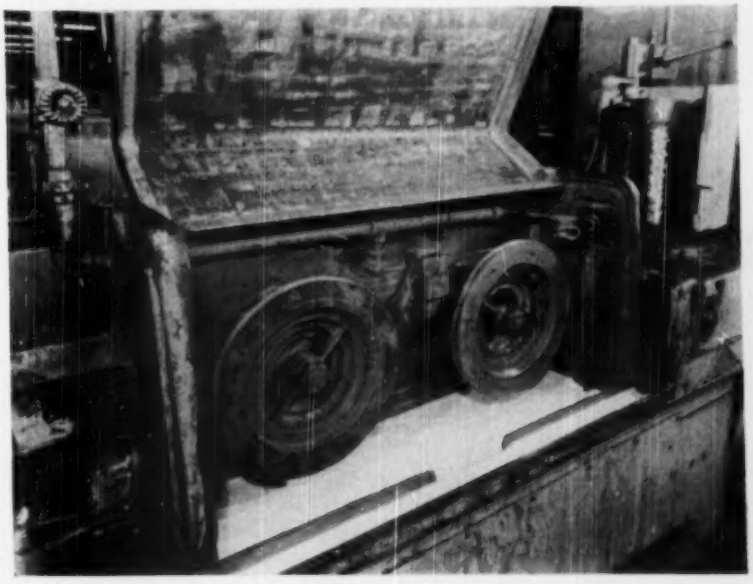
In 1910 a new building was erected for weaving iron wire screen. To protect it from corrosion the screen was first painted, but in 1915 two zinc plating lines were installed to produce "galvanized" screen and in 1918 two more zinc lines were added. In the search for still better protection, cadmium plating was investigated in 1924 but found too costly. Much later the Corronizing process, developed by Standard Steel Spring Company of Coraopolis, Pa., was studied and adopted. One Corronizing line was installed in 1940, and at present there are three such lines, two for up to 48-inch wide cloth and one for up to 30-inch wide cloth.

Besides the bronze, galvanized, and corronized wire cloth, the Hanover Company produces aluminum, monel, stainless steel and plastic wire screen and cloth.

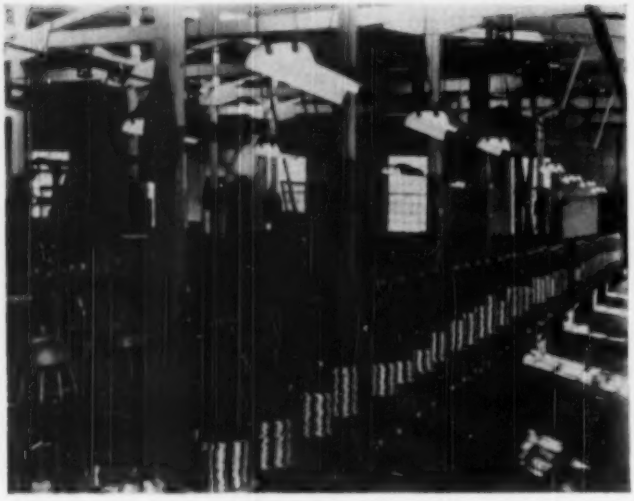
The entire plant is air conditioned and the air filtered, with a temperature of 75° F being maintained throughout the year. The installation of air conditioning has doubled the production.

The manufacturing of wire screen cloth starts with

Further reduction in wire gauge, from 0.045 to 0.11 inch, is accomplished by means of small drawing machines, seen here from the side of the uncoiling mechanism

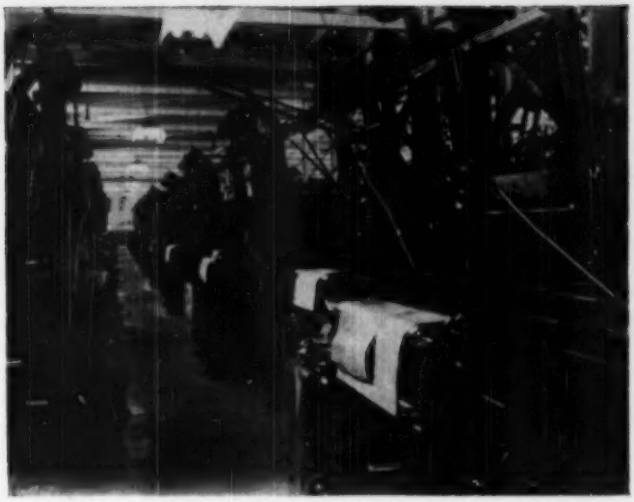


Detail of a small drawing machine shows the 0.045 inch wire entering at the bottom and being reduced to 0.011 inch by a series of twelve diamond dies. The drawing solution is at the bottom



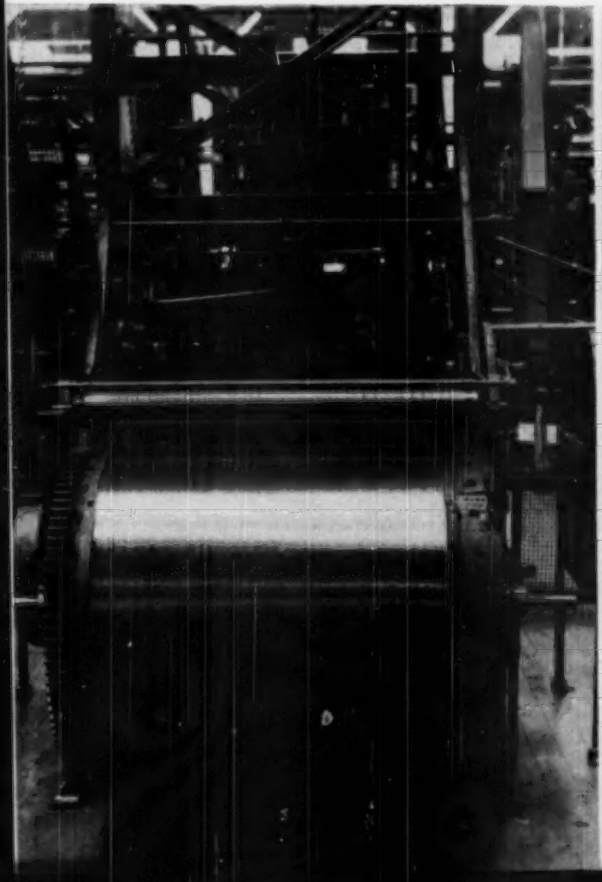
Transfer of the wires from the bundles to bobbing spools is accomplished on these machines. The uncoilers of the reelers appear in foreground

From spools to large warp drum is the next step, which is taken on this warp machine

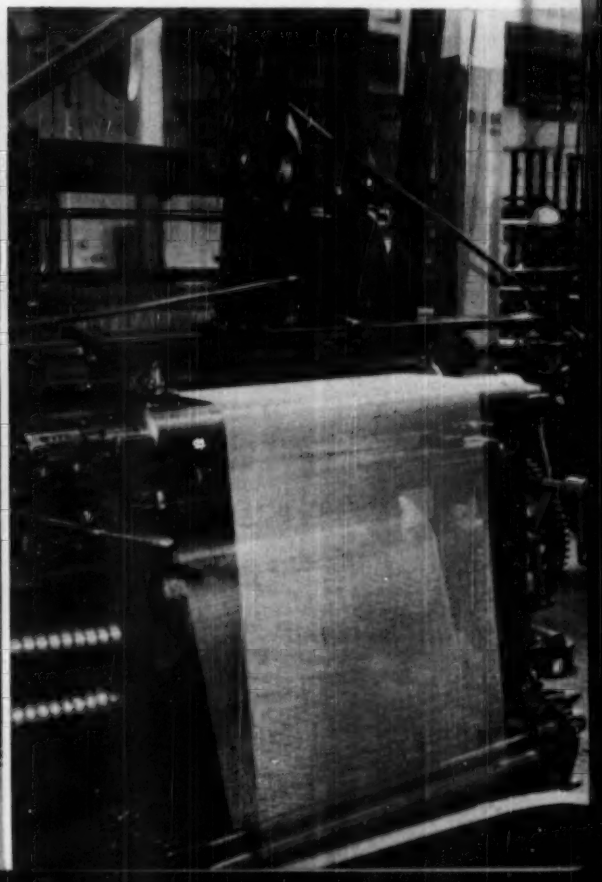


The loom is the heart of the weaving department. This picture shows two banks for weaving of wire screen

The back of the weaving loom with the warp drum in place



The front of the weaving loom shows the wire screen coming off the machine



On Cover: *A view of one of the corronizing lines, with another in the background, showing nickle tank, rinse tank and zinc tank. Note driving mechanism and overhead ventilation ducts.*

¼-inch rod. This rod is reduced in a Synero wire drawing machine to 0.045-inch wire which is coiled on large spools and later reduced further by drawing to 0.011 inch.

From this final drawing operation the wire is sent to the weaving room. The 0.011-inch wire is transferred from reels to bobbins with one operator loading from 150 to 200 bobbins per hour. It is also transferred from spoolers to the warp spools. A 16-mesh screen cloth requires 16 individual wires for each inch of width, i. e., a 48-inch wide cloth requires 48 x 16 = 768 individual wires.

There are 350 looms in this plant which are completely automatic, stopping automatically in case of breakage or empty bobbins. Maintenance of these looms requires great skill.

After the iron wire has been woven into screen and cloth, it is removed from the looms, each roll is weighed and then delivered to the plating department for processing.

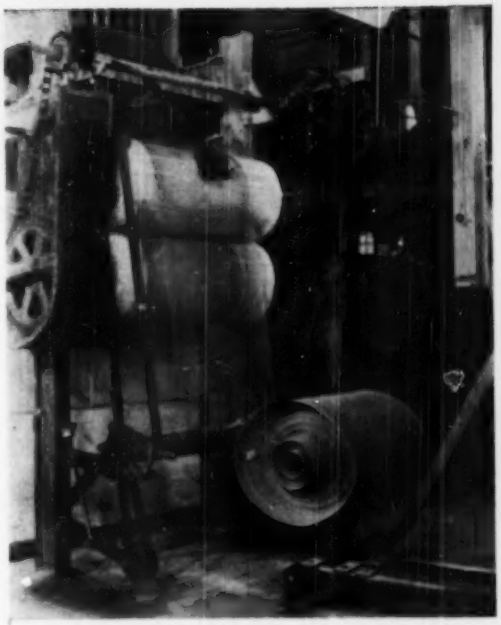
In the Corronizing process the wire screen is placed on an uncoiler, and the end spliced to the preceding screen. The material passes through a burning chamber which removes all grease and oil films and then through an electrolytic cleaner, a rinse, a pickle, another rinse, and into the nickel plating solution. The method of nickel plating consists in passing the woven wire screen over rolls at the top of the solution and under rolls in the bottom of the solution, the screen moving in a vertical plane. Nickel anodes are placed behind the vertical loops. At the end of the tank the screen is blown free of nickel solution, enters a

Plating of the wire screen takes place on several lines. Plating tanks of two Corronizing lines are shown here. Besides the anodes visible in the picture, other anodes hang under each top roller. The rollers near the bottom of the 5-feet deep tanks are hidden by the solutions

rinse, and then an acid zinc plating bath. Here the material is processed in the same manner as in the nickel bath. Following rinsing the screen is thoroughly dried and passed through infrared burners which alloy the nickel and zinc coatings, producing the gamma-nickel-zinc alloy phase which is characteristic of Corronizing.

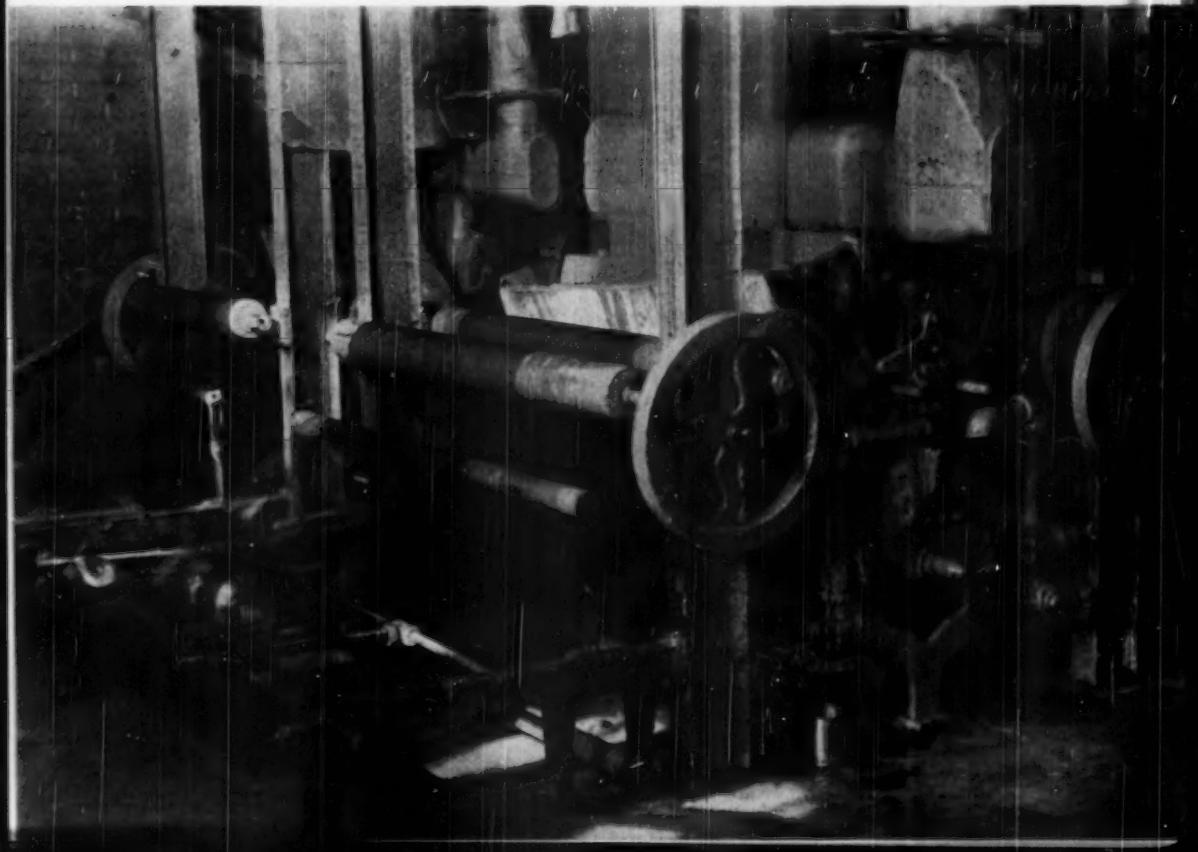
From the burners the screen is reeled, measured, and recoiled. Test samples are taken at this point to make certain that the nickel and zinc coatings meet specifications and that alloy formation is correct. The entire operation of Corronizing is controlled electrically and the heating closely controlled thermostatically. Electrostripping, analysis, and salt spray testing are carried out in close conjunction with the processing.

The screen is processed through a continuous paint line and oven and then rolled into 100-foot lengths, packaged in cardboard boxes for shipment, and shipped to all parts of the country. One large outlet is Sears, Roebuck and Company.



▲ **Heating units for Corronizing** use controlled Burdette gas burners. Note the footage measuring device, the recoiler, and the coil wired to keep from uncoiling during transfer

▼ **Painting machine** in which the wire screen is uncoiled, painted, dried and recoiled, ready for cutting in final lengths, recoiling, boxing and shipping



DEPOSITION OF PRECIOUS METAL ALLOYS*

A. K. GRAHAM†, S. HEIMAN‡ and H. L. PINKERTON†

(*Continued from January, 1949*)

IV. BROMIDE, IODIDE AND FLUORIDE SYSTEMS

Introduction

The work reported in the previous sections of this paper indicated that the desired 60–20–20 silver-platinum-gold alloy could be deposited from a chloride system containing large amounts of lithium chloride to maintain the silver in solution. The quality of the deposit, however, was unsatisfactory, and there were strong indications that this was due to the fundamental chemistry of the solution which permitted codeposition of gold by immersion. No improvement was obtained with any of the usual expedients.

Since the members of the halogen family often exhibit sharp and unexpected differences in their chemical behavior, other halide systems were investigated.

Because of the difficulties encountered with gold in attempting to deposit the ternary alloy from the chloride system, it was decided to include a study aimed at depositing a 60–25–15 silver-platinum-copper alloy which previous tests with cast compositions had shown to have properties almost as favorable as those of the 60–20–20 silver-platinum-gold alloy. The permitted range of composition was: silver, 60 to 65 per cent; platinum, 20 to 30 per cent; copper, 10 to 15 per cent.

Chemistry of the Halides of Silver, Gold, Platinum and Copper

1. *The Fluoride Systems*

Silver fluoride is well known and may be used for plating.

Aurous fluoride does not exist in the presence of water and there is no conclusive evidence that it exists at all. All attempts to prepare auric fluoride have resulted in precipitation of auric hydroxide. For example:

$$AuCl_3 + 3AgF + 3H_2O = 3AgCl + Au(OH)_3 + 3HF$$

No solvent medium could be found which would dissolve silver fluoride and auric chloride without such decomposition[34].

Platinic fluoride is decomposed by water to hydrofluoric acid and hydrated platinic oxide, and no means of preventing this has been found[35]. The lower fluoride of platinum was claimed to exist by Moissan, but Mellor makes no other mention of it.

The solubility of the fluorides of copper decreases with increasing concentration of alkali fluorides, indicating the non-existence of complex alkali copper fluorides[36].

It is evident that the fluoride system is totally unsuitable for depositing these alloys.

2. *The Bromide and Iodide Systems*

In the deposition of the 60–20–20 silver-platinum-gold alloy from the chloride system, the limiting factor in the solubility of silver chloride. As shown previously, the only convenient chloride salt for its solution is concentrated lithium chloride, in which silver chloride will dissolve to an extent of about 15 g/l of silver.

The alkali bromides are much more water-soluble than the corresponding chlorides and the iodides even more so, and both can be used in higher concentrations. Therefore, in the bromide system, the solubility of silver bromide is more favorable; at least 40 g/l of silver as silver bromide or at least 40 g/l platinum as bromoplatinic acid or both can be dissolved at room temperature in solutions containing 600 to 800 g/l of sodium or lithium bromides.

In the iodide system, silver iodide is extremely soluble, e.g., over 275 g/l of silver as silver iodide will dissolve in 1200 g/l of sodium iodide. Instead it is the solubility of the platinum salt that is limiting, being only somewhat above 10 g/l of platinum as iodoplatinic acid in 800 g/l sodium iodide. (This figure is very approximate due to the extremely dark red color of the solution and to doubt as to whether the "insoluble matter" observed above 10 g/l is really that or decomposition products. No attempt was made to settle this question because the 10 g/l was ample for

*The research reported in this paper was sponsored by the Sterling Silversmiths' Guild of America. †Consultants, Graham, Crowley & Associates, Inc., Jenkintown, Pa. ‡Now Chief Chemist, Philadelphia Rustproof Company, Philadelphia, Pa.

our requirements.) As will appear later, the iodide system generally tends to be less stable than the bromide system which is very favorable in this respect.

The solubility of copper as cuprous iodide at 70° F was determined as 13 g/l in 600 g/l of sodium iodide and 32 g/l in 960 g/l of sodium iodide. The solubility of the copper bromides was not determined but did not appear limiting in any of the work done with them.

One striking example of the individuality of apparently similar elements was noted early in the program. About 10 g/l of platinum as iodoplatinic acid was dissolved in 400 g/l of lithium iodide. On standing several days, the solution which originally had the characteristic color of polyiodide had become decolorized and platinum had precipitated quantitatively as a platinum mirror on the sides of the beaker. The addition of a small (far less than equivalent) amount of iodide ions to an ordinarily very stable solution of lithim bromoplatinate was sufficient to precipitate all the platinum in the same fashion. The introduction of lithium ions into any iodoplatinate bath had the same result.

3. *Valence of Platinum, Gold and Copper*

As far as is known to the authors, platinum remains in its high valence state in all the halide systems used.

Gold[34] in chloride systems exists in the auric condition, but auric bromide and especially auric iodide break down with liberation of free halogen until some equilibrium state with the aurous ions has been established. When aurous iodide is dissolved in sodium iodide, there is a similar effect; some of the gold in the auroiodide complex undergoes auto-oxidation and reduction, forming auri-iodides and free gold. This reaction was observed whenever a bath was made using an aurous compound as the source of gold. When auric compounds were used, the characteristic color of alkali polyiodide (or polybromide) appeared, and cathode efficiencies of 100 per cent, calculated on the aurous ion, were obtained.

Copper behaves similarly to gold. It forms a relatively stable cupric chloride, but the cupric bromide and iodide in alkali halide solutions tend to break down to the cuprous condition, the final equilibrium depending on the concentration of alkali halide. Seidell[37] gives the equilibrium at saturation for copper bromide in potassium bromide, showing that in more than 10 g/l of potassium bromide, all the copper is in the cuprous condition.

These valence considerations may be used to explain why it was found possible to deposit silver-platinum-copper alloys from bromide and iodide baths but not from chloride baths, as shown by exploratory tests not reported here: since the copper is in the cuprous condition in the former baths, its deposition potential is brought much closer to those of the nobler metals. On the other hand, however, this does not explain why silver-gold alloys could be obtained from the iodide but not from the chloride baths, since in this case the deposition potential of aurous gold would be expected to be still farther removed from that of the silver; the phosphates or other complex-forming substances present in the iodide bath may be responsible for the ability of the two metals to codeposit.

The nature of the gold immersion deposit obtained on silver or silver alloys in the chloride bath differs greatly from that in the bromide or iodide baths: in the former, a black sponge is deposited, but in the latter, a bright, very thin deposit of adherent gold is obtained, and only relatively slowly. This must be explained by the valence difference in the two baths because the presence or absence of other compounds had no effect. It is to this phenomenon that the authors ascribe the ability of the bromide and iodide systems to deposit sound plates as contrasted with the chloride system.

4. *Anode Solubilities*

Whereas in the chloride system it was found possible to use soluble anodes, this was not feasible in the iodide or bromide baths in which platinum was found to be totally insoluble at any *p*H above 1. Higher acidities were not useful because of objectionable gassing and poor quality of the resulting deposits. Gold and copper anodes dissolved, the latter as cuprous ion with 100 per cent efficiency at low current densities and with lowered efficiencies as the current was increased; gold dissolved as aurous ion with less than 100 per cent efficiency, but when gold was present in the anolyte, replacement occurred and gold and silver particles fell continuously from the anode. Consequently, in all work with the iodide and bromide baths, insoluble platinum anodes were used and placed in an alkali halide anolyte, with the catholyte in a porous cup.

General Plating Procedure

Silver-plated cathodes were used in all plating tests, except in making specimens for analysis. The cathodes were touched lightly on a rouge buff, electrocleaned cathodically, flashed with gold to prevent initial deposition by immersion, rinsed, and dipped in a concentrated solution of the appropriate alkali halide (about 300 g/l). After plating to about 0.1 mil (0.0025 mm), the cathodes were again rinsed in the alkali halide before they were rinsed in water. Separate bath samples were used in each test to minimize concentration changes due to the use of insoluble anodes; only one sample deposit and one deposit for analysis were made from each bath, and the metal removed was not enough to cause significant changes in composition.

The analytical deposits were plated on tantalum cathodes. These were readily plated after having been subjected to a light rubbing with steel wool, flashing first in a Rochelle cyanide brass bath at 50 asf (54 amp/dm^2) and then in a cyanide gold bath, and the above mentioned rinses. About 0.3 to 0.4 mil (0.0075

TABLE V. COLOR OF SILVER-PLATINUM-GOLD DEPOSITS

Color Rating	Analysis		
	% Ag	% Pt	% Au
Very dark	25–35	over 32	25–35
Dark (about color of bright nickel)	54–66	24–30	10–16
Slightly dark	62–76	12–24	14–18
Fair (barely distinguishable from silver)	54–75	10–12	12–34
Excellent silver color	71–76	2–7	17–27

to 0.001 mm) of alloy was deposited; the plate was quickly and cleanly stripped in hot nitric acid with complete solution of the brass undercoating and partial solution of the precious metal deposit. In the subsequent analysis due allowance was made for the undercoatings. The undissolved gold and platinum was filtered off and silver determined in the filtrate as chloride. The filtrate from the silver chloride precipitation which contains some platinum was combined with a solution obtained by dissolving the gold-platinum residue in aqua regia. Gold was precipitated from the combined solution with ferrous sulfate, filtered off, and weighed, and the platinum was precipitated from the filtrate with magnesium.

To illustrate the type of bath employed in all this work, the following general formula is given which shows the usually preferred and the extreme ranges of bath composition and plating conditions (M = sodium or lithium, X = iodide or bromide):

	Preferred Range	*Extremes Used*
MX	600–800 g/l	400–1000 g/l
Ag (as AgX)	25–40 g/l	10–40 g/l
Au (as AuX or AuX_3)	3–5 g/l	1.5–12 g/l
Pt (as H_2PtX_6)	7–10 g/l	6–11 g/l
*Cu (as CuX or CuX_2)	3–5 g/l	3–5 g/l
Na_2HPO_4†	‡30 g/l	0–250 g/l
*p*H, electrometric	5–6	1–10
Current density	3–10 asf	3–50 asf
Temperature	80–160° F	80–220 ° F

Deposition of Silver-Gold-Platinum Alloys

Good quality deposits of the desired composition were obtained from the sodium iodide and sodium bromide systems. Equally good plates were obtained from the lithium bromide bath, but not enough work was done with it to obtain the 60–20–20 alloy. In all, over 90 deposits were analyzed, mostly from the two sodium baths. The thicker, 0.3–0.5 mil (0.0075–0.0125 mm) analytical deposits were rarely bright, although often semi-bright or smooth. Many of the thin plates were fully bright, and except when there was evidence of halide occlusions, all of them were ductile, as determined by a simple bend test.

The color of the deposits was disappointing; it did not correspond with the color of the cast alloys, being darker and colder in tone. At first, this was ascribed to the possible occlusion of halogens or halides in the deposit reported by Schlotter[45] to take place in silver iodide, and more specially in copper iodide, baths at low temperatures and high current densities. In the case of the copper alloys, this observation was confirmed in the present work, but there was no direct evidence of such occlusions in deposits from silver baths containing no copper. All attempts to "decolorize" these dark deposits by heating or chemical treatment were unsuccessful. At the end of the work, all deposits except the yellow high gold alloys were rated as to darkness and could be grouped according to composition as shown in Table V. There seems to be a direct correlation between the platinum content of the deposited alloy and its color, and it will be seen that all plates of the desired 60–20–20 composition were too dark. It is known that in deposition of other alloys, brass for example, the color of the electrodeposit is often different from that of the cast alloy of the same composition. This is usually ascribed to differences in crystal structure, and it seems likely that this explanation may also be valid in the present case.

Some typical deposit compositions obtained under various conditions are shown in Table VI. It is not possible, especially with ternary alloys, to predict in advance the effect of plating variables on deposit composition. The apparent relative nobility of the metals may change with changing conditions. No parallel can be drawn, for instance, between the sodium iodide and sodium bromide systems; from the scanty data available the lithium bromide bath appears to differ from both.

*When used, in place of gold. †Other compounds, especially sodium tetraborate and sodium benzoate were also beneficial; all caused brightening of the plate, and the tetraborate, and more specially the phosphate, greatly minimized the effect of current density on deposit composition. ‡Adjusted with HX or MOH.

TABLE VI. TYPICAL COMPOSITIONS OF SILVER-PLATINUM-GOLD ALLOYS

Solvent Halide	Bath Data: Metal, g/l			Additions g/l	Temp. °F	pH	C.D. asf	Deposit Composition, %			Cath. Eff. %
	Ag	Pt	Au					Ag	Pt	Au	
NaI, 800	40	10	4	Na_2HPO_4, 30	80	4.5	3	44	35	19	100
							9	62	18	20	90
							30	69	18	12	95
					170	4.5	9	17	57	26	100
							30	54	29	16	92
					80	1	9	29	33	38	64
							30	54	28	17	78
							50	66	20	14	60
					80	9	9	56	30	14	89
							30	74	20	6	92
				None	80	4.5	3	7	52	40	65
							9	19	39	39	68
							30	59	23	16	77
	15	9	1.6	Na_2HPO_4, 30	80	4.5	9	55	35	10	97
NaBr, 700	30	10	5	None	80	4.8	3	43	12	45	69
							9	71	10	19	94
							18	68	23	10	100
							30	64	24	12	100

TABLE VII. TYPICAL COMPOSITIONS OF SILVER-PLATINUM-COPPER ALLOYS

Solvent Halide	Bath Data: Metal, g/l			Additions g/l	Temp. °F	pH	C.D. asf	Deposit Composition, %			Cath. Eff. %
	Ag	Pt	Cu					Ag	Pt	Cu	
NaI	15	10	5	Na_2HPO_4, 30	80	5.3	9	72	4	24	63
							30	64	21	15	72
NaBr	15	10	5	Tartaric acid, 30	80	0.3	9	92	2	6	54
							30	84	7	9	44
LiBr	11	8	4	Na_2HPO_4, 30	80	1.0	3	91	5	4	50
							9	73	16	11	64
							3*	90	3	4	48
							9*	76	12	12	60

*In this series, cupric bromide was used as the source of copper; in all other cases, cuprous bromide was used.

Deposition of Silver-Platinum-Copper Alloys

The deposition of these ternary alloys was not extensively investigated. It will be seen from Table VII that the desired 60–25–15 alloy was deposited from the sodium iodide bath at 30 asf. All the silver-platinum-copper alloys could be easily plated directly on both the silver cathodes and the silver plated tantalum cathodes without gold flashing. There was a strong tendency toward codeposition of halides except in the sodium bromide bath which contained tartaric acid; no work was done to determine whether the tartrate ion was responsible for inhibiting this tendency. The cathode efficiency was low in all these tests. Table VIII is a summary of the suitable halide baths for producing the ternary silver-platinum-gold and silver-platinum-copper alloys.

Deposition of Binary Alloys of Silver, Platinum, Gold and Copper

1. *Silver-Platinum*

Good silver-platinum alloy deposits were obtained from sodium iodide, sodium bromide, and lithium bromide baths. Alloys containing up to 25 per cent platinum were obtained without varying the bath composition very widely. Table IX shows typical compositions of this and the other binary alloys studied.

TABLE VIII. SUMMARY OF TERNARY ALLOY SYSTEMS

Halide	Alkali, in order of decreasing normality at saturation at 20° F	Compatibility with					Can System Deposit Ternary Alloy?		Plate Quality
		Ag	Pt	Au	Cu	PO_4^{3-}	Ag-Pt-Au	Ag-Pt-Cu	
Chloride	Li	X	X	X	X	I*	X	I	Poor
	Ca	X	X	X	?	I	?	I	?
	Mg	X	X	X	?	I	?	I	?
	NH_4	X	I	?	?	X	I	I	.....
	Na	L	X	X	X	X	I	I	.....
	K	L	I	?	?	X	I	I	.....
Bromide	Li	X	X	X	X	I*	X	X	Good
	Ca	?	?	?	?	I	?	?	?
	Mg	?	?	?	?	I	?	?	?
	Na	X	X	X	X	X	X	X	Good
	NH_4	L	I	?	?	X	I	I	.....
	K	L	I	?	?	X	I	I	.....
Iodide	Ca	?	?	?	?	I	?	?	?
	Na	X	X	X	X	X	X	X	Good
	Li	X	I	X	X	I*	I	I	.....
	NH_4	?	I	?	?	X	I	I	.....
	Mg	?	?	?	?	I	?	?	?
	K	?	I	?	?	X	I	I	.....
Fluoride	NH_4	?	U	U	U	X	I	I	.....
	K	X	U	U	U	X	I	I	.....
	Na	L	U	U	U	X	I	I	.....

*Except at low pH. Legend: X — Compatible or suitable I — Incompatible or unsuitable L — Limited solubility U — Unknown or unstable compound ? — No data, no known unfavorable factors

TABLE IX. TYPICAL COMPOSITIONS OF BINARY ALLOYS OF SILVER, PLATINUM AND GOLD

Alloy	Bath Data							Deposit Composition, %			Cathode Eff. %
	Solvent Halide, g/l	Metal, g/l			Temp. ° F	*p*H	C.D. asf	Ag	Pt	Au	
		Ag	Pt	Au							
Ag-Pt	LiCl, 500	14	16	...	180	acid	2	12	88	...	51
	NaBr, 700	40	10	...	80	0.8	9	97	3	...	89
							30	90	10	...	93
	LiBr, 1000	29	7	...	80	acid	3	94	6	...	76
							30	97	3	...	68
	NaI, 500	14	6	...	140	1.0	8	95	5	...	100
Ag-Au	NaI, 800*	40	...	5	80	7.5	3	68	...	32	59
							9	84	...	16	79
	LiI, 750†	40	...	4	80	5.6	3	72	...	28	Poor
							9	85	...	15	deposit
Au-Pt	HCl, 400ml	...	16	10	80	acid	20	...	37	63	.....
	NaI, 800*	...	10	5	80	6.4	9	...	68	32	90
							30	...	67	33	48

*Bath also contains 30 g/l Na_2HPO_4. **Bath also contains 30 g/l $Na_2B_4O_7$.

2. *Silver-Gold*

This alloy could not be deposited from the chloride system. (Section III of this paper.) However, good deposits containing up to 30 per cent gold were obtained from the sodium iodide bath containing disodium phosphate. The lithium iodide baths containing sodium tetraborate gave less satisfactory deposits of about the same composition. It will be recalled that the presence of lithium chloride in the gold chloride bath caused sponginess: possibly this is a parallel

phenomenon, but it was not further investigated. The possible role of the added phosphate or tetraborate in bringing about codeposition of the two metals was not evaluated.

3. *Platinum-Gold*

Alloy plates containing up to 70 per cent platinum were obtained from the sodium iodide bath. The deposits, however, were extremely dark and poorer than those obtained from the lithium chloride bath. No other systems were studied.

4. *Silver-Copper*

The purpose of this phase of the investigation was to determine whether an alloy of sterling composition (6.5 to 8.9 per cent copper) could be deposited over a reasonable (threefold) range of current density from the sodium iodide bath.

This was not achieved, although a number of deposits of the required composition were obtained. The current density range over which this composition would be deposited was in every case quite restricted and in the most favorable instance only from 15 to 20 asf.

Bath conditions were varied rather widely, but higher temperatures were not investigated since a rise in temperature would tend to make the composition/current density curve even steeper. Various complex-forming compounds had negligible or unfavorable effects. Except in baths containing cyanide or thiosulfate the deposits were uniformly good. Soluble anodes of silver and copper were used with separate current control; anode and cathode efficiencies were close to 100 per cent as long as anode current densities were kept below about 15 asf. Some typical compositions are shown in Table IX.

Summary

A rather exhaustive study of alkaline systems failed to achieve deposition of a 60–20–20 silver-platinum-gold alloy. Alloys containing up to about 6 per cent platinum could be deposited from cyanide baths provided the free cyanide content was substantially zero.

Good quality deposits of 60–20–20 silver-platinum-gold were deposited from the sodium iodide and sodium bromide systems, unsatisfactory deposits of the desired composition from the lithium chloride system. Good plates were also made from the lithium bromide bath and presumably the composition could be controlled. It was shown that other alkali halide systems are of doubtful value for the deposition of these alloys.

Silver-platinum-copper deposits of good quality were obtained from the sodium iodide, sodium bromide, and lithium bromide systems; the composition was controlled to give the desired alloy in the sodium iodide bath and could probably be controlled in the other two. Other alkali halide systems are excluded or of uncertain value.

Excellent deposits of silver-platinum alloys over a wide range of composition were produced from the sodium iodide, the sodium and lithium bromide, and the lithium, calcium, magnesium, and aluminum chloride baths.

Fairly good deposits of silver-gold alloys were obtained from the sodium iodide and lithium iodide baths; the sodium and lithium bromide systems should be equally favorable.

Platinum-gold alloys were deposited from lithium chloride and sodium iodide baths, and the bromides would probably serve equally well. The first-named bath yielded the most satisfactory deposits.

Silver-copper alloys were deposited from the lithium chloride and the sodium iodide baths, but the current density/composition relationship is unfavorable for depositing sterling alloy commercially.

Alloys of silver-palladium, silver-rhodium, silver-iridium, silver-ruthenium, silver-osmium, silver-bismuth, silver-mercury, platinum-palladium, and silver-platinum-palladium were deposited in excellent form from lithium chloride baths.

Silver-nickel, silver-iron, silver-tin, silver-arsenic, and silver-lead alloys could not be successfully codeposited from chloride solutions.

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DISPOSAL OF PLATING ROOM WASTES

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A report on the status of A.E.S. Research Project 10

WASTE DISPOSAL STUDIES

By C. FRED GURNHAM

Chemical Engineering Consultant, New Haven, Conn.
(Chairman of A. E. S. Research Project No. 10, and Vice-Chairman of A. E. S. Research Directing Committee)

THE PLANNING and ultimate design of treatment plants for industrial wastes must, obviously, be an individual task for every plant. It may be handled by engineers within the plant, by a consultant retained for the purpose, or by both, but it is hardly possible to conceive of a "package" treatment plant which can be purchased and installed without engineering studies for the particular plant.

Nevertheless, there are a large number of factors which are common to all plants in the same industrial group, e. g., to all electroplating shops. Many plants will be able to use similar treatment processes, even though each unit must be adapted to a different field condition. Therefore, economies are achieved when joint efforts of all related manufacturers are directed to the common problems. The value of such efforts has been demonstrated by the valuable contributions made by the National Council for Stream Improvement, the Iron and Steel Institute, and the American Leather Chemists Association, to mention just a few groups.

About two years ago, the American Electroplaters' Society undertook to correlate and extend research on wastes from the plating industry. This work is under the direction of Professor B. F. Dodge, Head of the Department of Chemical Engineering at Yale University. Dr. Dodge, having worked for several years with the Connecticut State Water Commission on the disposal of waste from the copper and brass industries, is eminently qualified for this task. It is the purpose of this report to indicate what has been accomplished to date and the plans for the future.

A comprehensive statement of the objectives of the project was drawn up at an early stage and is presented here. We do not plan laboratory investigations of all of the listed items, especially in the biological field, but certainly all of them are of interest to the project. The objective is: "A study of the waste liquids from electroplating and closely related processes,

with respect to
- their compositions
- their volumes
- their effects on natural streams and aquatic life
- their effects on sewage treatment processes

with particular attention to
- methods of recovery of valuable constituents
- methods of treatment and disposal of wastes

taking into account
- various sizes of plating establishments
- various types of plating within each establishment
- disposal facilities of each establishment
- economics of various possible procedures

by means of
- a survey of the existing literature
- a critical review of suggested treatment processes
- laboratory investigations and pilot plant operation
- observation or design and improvement of industrial treatment plants".

Following the example of earlier research projects of the Society, the first undertaking was the preparation of a comprehensive bibliography dealing with all phases of the disposal of wastes from the plating and closely related industries. This bibliography has been completed (as far as any bibliography on an active subject can be "completed") and has been published as A. E. S. Research Report Serial No. 9. Over 700 references are included, and the Project Committee† thinks it is quite thorough, although there must always be questions on the inclusion or omission of border-line subjects.

A bibliography of this type is a useful tool for the men conducting research in this field, but is not particularly interesting or useful to the engineer whose job it is to design a treatment plant. Therefore, our second step has been to review the papers listed in the bibliography and to prepare a correlated abstract of them. This review has been written with a critical mind, and papers of purely academic interest or of dubious value have been weighted lightly or not at all in this paper.

In order to keep the size of this critical review within reasonable bounds, we have broken it down into

(Continued on page 176)

*From a paper presented at the Industrial Waste Conference, Purdue University, September 21-22, 1948. †Besides the author, the Project Committee consists of Mr. Malcolm Orr, International Silver Company, Meriden, Conn., and Mr. W. R. Huey of E. I. du Pont de Nemours & Co., Inc., who recently succeeded Mr. M. L. Ross of the same company.

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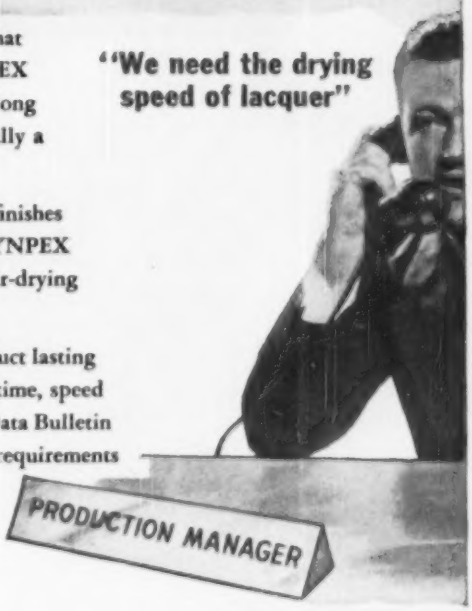

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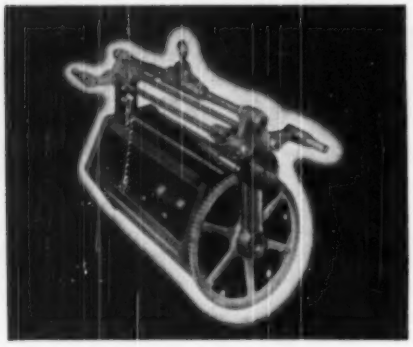

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Determination of Impurities in Electroplating Solutions

XI. TRACES OF AMMONIUM* IN NICKEL PLATING BATHS

The colorimetric determination of ammonia by the use of Nessler's reagent has been reported in such wide and successful use that this method should be applicable to the determination of ammonium in nickel plating baths, even when appreciable quantities of aluminum, calcium, cadmium, chromium trioxide, copper, iron, lead, manganese, silicon and zinc are present as impurities.

Other colorimetric methods for the determination of ammonia, as well as many variations of the Nessler reaction, have been developed. Ammonia reacts to form a color with phenol and sodium hypochlorite, and this reaction provides a rapid method of analysis[5,13]; the presence of a considerable amount of free acid, however, interferes with the determination. A fresh mixture of silver nitrate and tannin which produces a color with ammonia due to the liberation of free silver, is even more sensitive than Nessler's reagent[17]. Ammonia and ammonium salts oxidized with sodium hypobromite also form a color in the presence of phenols; the colored material can be extracted wiht ethyl ether or xylene and the color measured photometrically [6,13,16]; free acid interferes. Ammonia has also been determined by the reaction of Graves' reagent with a sample after ashing with sulfuric acid and extraction of the ash with acetic acid and sodium acetate[12].

In addition to these methods, there are many variations of Nessler's reagent employed in the analysis of nitrogen. The Folin-Wu modification[6] is a more dilute reagent for use in biological analyses. A special form of Nessler's reagent described by Treadwell[14] is found to be best suited for the analysis of nitrogen in sea water. Frederick[7] and Winkler[18] give other modifications. A nephelometric method[8] makes use of a modified Nessler's reagent and the fact that the reagent tends to give a colloidal precipitate if the concentration of ammonia is high.

Many methods and variations thereof have been reported for the preparation of the sample which is to be analyzed and for the isolation of the ammonia. The Kjeldahl method is perhaps the most widely used because of its general applicability. The use of Devarda's alloy, acidifying with tartaric acid, and distilling over the ammonia has been reported by Beater[4] as a means of separating nitrogen from soil.

In the analysis of steels for combined ammonia, the Allen method[3] is widely used. It consists of dissolving the sample, in the form of drillings, in hydrochloric

*Since the plating chemist is primarily concerned with the ammonium ion content of his plating solutions, the A. E. S. Research Committee has requested that all results be expressed in terms of ammonium, NH_4, instead of the standard "ammonia nitrogen". To convert to the latter, divide by 1.288.

TABLE I. CALIBRATION CURVE DATA

Ammonium microgram	Scale Reading	Blank	Corrected Reading	Average Reading
0	3			3
0	4			
25.8	25	3	22	
25.8	22	3	19	19
25.8	20	3	17	
51.5	38	3	35	
51.5	39	3	36	35
51.5	36	3	33	
77.3	53	3	50	
77.3	58	3	55	54
77.3	60	3	57	
128.8	93	3	90	
128.8	98	3	95	92
128.8	94	3	91	
193.2	141	3	138	
193.2	142	3	139	137
193.2	138	3	135	

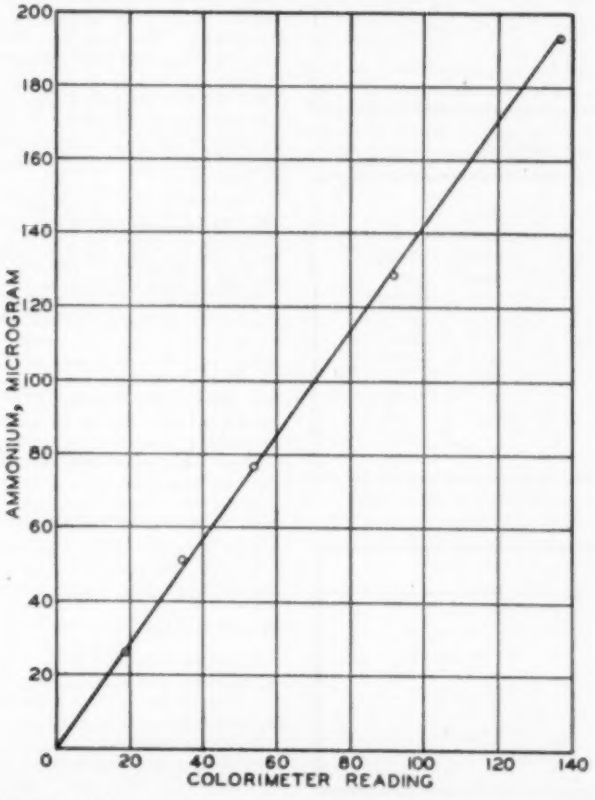

Fig. 1. Calibration curve for determination of ammonium in nickel plating baths (all-chloride bath used) by Nessler's reagent method. Instrument used: Klett-Sommerson colorimeter with blue filter No. 42. Cell: test tube. Final volume of solution: 100 ml

acid (sp. gr. 1.11), making the solution alkaline with lime, and distilling off the ammonia which is liberated. For a few of the many modifications of the Allen method, reference may be made to articles by Tschischewski[11], Weiss[12], Johnson[9], Ruff[13], Jordan[14], and Beeghly[4].

Developmental Work

Since the conditions under which ammonia nitrogen has been determined have been so varied, little trouble was expected in developing a procedure for the determination of ammonium in nickel plating baths.

The only point which seemed to warrant any study was that of the effect of the large amount of nickel and impurities present on the quantitative recovery of the ammonia. This point was easily checked by running standard samples of ammonium through the prospective procedure with and without the nickel bath present. The results showed that the presence of the nickel and the impurities had no effect upon the recovery of ammonia and that the procedure was applicable to the determination of ammonium in nickel plating baths.

Preparation of the Calibration Curve

Because preliminary experiments indicated that the procedure adopted would give satisfactory results, a series of runs was made to get data for constructing a calibration curve. The data were obtained by pipetting 2, 4, 6, 10, and 15 ml portions of a standard ammonium chloride solution respectively into clean micro Kjeldahl flasks, each containing 5 ml of a standard all-chloride nickel plating bath. A sixth flask contained only 5 ml of the bath which served as a blank. All six samples were then treated according to the "Recommended Routine Procedure" which is given in detail later in this paper. The results of these determinations, using a Klett-Sommerson colorimeter with a No. 42 blue filter, are shown in Table I.

The calibration curve shown in Fig. 1 was obtained by plotting the average readings against the corresponding quantity of ammonium. The straight line

relationship which the curve exhibits shows that the Bouguer-Beer's law is obeyed over the concentration range tested.

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In order that maximum sensitivity be obtained for the determination when a colorimeter is being used, the incident light should have a wave length at which the ammonia-Nessler reagent complex exhibits maximum absorption. Unfortunately, the absorption by the complex does not show a maximum anywhere in the visible range but increases steadily as the wave length decreases. The best filter, therefore, is one with its maximum light transmission at the blue end of the visible range—about 400 millimicrons. The No. 42 blue filter of the Klett-Sommerson colorimeter was found to be suitable [illegible] transmittancy is for light around 415 millimicrons.

Determination of the Accuracy and Precision of the Method

The accuracy and precision of the method were checked using a bath more closely approximating the conditions found in a commercial plating bath than the standard nickel plating bath used in preparing the calibration curve. This bath was made up by taking 100 ml of the pure standard nickel bath and adding various amounts of metals as impurities. The added metal ions and the amounts of each are given in Table II.

[illegible] and compounds were added as the solid chlorides, nitrates, or sulfates whenever possible. The solution was then heated, shaken thoroughly, cooled, and filtered.

To check the accuracy of the method the procedure described in the "Recommended Routine Procedure" was followed. Single runs were made instead of duplicates so as to indicate the accuracy which can be expected in individual runs. The results obtained are shown in Table III.

These results show that the accuracy of the method is good and that in all but the 25.8-microgram sample the relative error is 6 per cent or less. It will be noted that the blank remained the same in this test despite the presence of the impurities cited above.

An additional check on the accuracy of the method resulted from sending test samples containing a known quantity of ammonium to several companies for analysis by the procedure developed. The companies which kindly consented to do this work were Enthone, Inc., of New Haven, Conn., and Bethlehem Steel Company of Bethlehem, Pa. The test solution was prepared by adding enough ammonia to the impure standard bath used above to provide in the bath a concentration of 103 micrograms ammonium per milliliter. The results, including those obtained by the writers, are shown in Table IV.

The result of 119.8 was reported by a laboratory having an atmosphere high in ammonia. Considering this fact, this value did not seem too high and was thought to be a fair check.

The precision of the method was checked by making a quadruplicate run on portions of the same sample, each containing 103 micrograms of ammonium. The same procedure was used as that given in the "Recommended Routine Procedure". The results are shown in Table V.

These results show that the method has fairly good precision.

Recommended Routine Procedure

The procedure which was finally adopted for the determination of ammonium in nickel plating baths is as follows:

Reagents Required

1. Sodium hydroxide—15 *N*
   Dissolve 600 g quickly in enough ammonia-free water to make a liter of solution.
2. Nessler's reagent[3]
   Dissolve 50 g/l potassium iodide quickly in a minimum of cold water

TABLE II. IONS ADDED TO THE BATH

Ion	Quantity, mg	Equivalent, g/l
Aluminum	100	1.0
Cadmium	100	1.0
Chromic Trioxide	20	0.2
Copper	20	0.2
Iron	100	1.0
Lead	5	0.05
Manganese	500	5.0
Silicon (as silicate)	100	1.0
Zinc	100	1.0
Calcium	Saturated	Saturated

TABLE III. ACCURACY OF METHOD

Ammonium Added microgram	Scale Reading	Blank	Corrected Reading	Ammonium Found microgram	Error per cent
0	3	3			
25.8	23	3	20	28	+10
51.5	39	3	36	50	− 2
64.4	49	3	46	64	0
103.0	70	3	67	96	− 6
128.8	88	3	85	122	− 5

TABLE IV. RESULTS FROM DIFFERENT LABORATORIES

Laboratory	Ammonium microgram/ml
A	101.4
B	119.8
C	103.0

(approximately 35 ml). Add slowly a saturated solution of mercuric chloride until the first slight precipitate of red mercuric iodide persists, and then add 400 ml of a clarified 9-*N* solution of sodium or potassium [illegible]. Dilute the solution to 1 l with ammonia-free water, and allow it to clarify by settling of the precipitate formed. Siphon off and use the clear supernatant liquid. The reagent does not deteriorate and can be stored indefinitely.

3. Standard ammonium chloride solution—10 micrograms/ml
   Dissolve 3.818 g resublimed c.p. ammonium chloride in enough ammonia-free water to make 1 l of a stock solution containing 1.288 mg ammonium per milliliter. Dilute 10 ml of this stock solution to 1 l to obtain a solution containing 12.88 micrograms of ammonium per milliliter.
4. Standard nickel plating bath
   Dissolve 347.2 g c.p. nickel chloride and 30.0 g boric acid in enough ammonia free water to make 1 l of solution.
5. Ammonia-free water
   Add 2 ml concentrated c.p. sulfuric acid to 1 l of distilled water. Redistill and collect the middle 800-ml portion for use.

Apparatus Required

1. Pipettes of 1-, 2-, and 5-ml capacity, accurately calibrated
2. Micro Kjeldahl unit (Fig. 2) of Pyrex glass with all individual parts connected with standard-taper ground-glass joints
3. 100-ml volumetric flasks
4. Klett-Summerson colorimeter with the No. 42 blue filter, or any other colorimeter or photometer with a filter of maximum transmittancy at about 415 millimicrons

Procedure

A. Separation of the Ammonia

1. Place 1 ml of the nickel plating bath in the Kjeldahl flask, after having made certain that the apparatus is free of ammonium.
2. Add 6 ml 15-*N* sodium hydroxide.
3. Connect the flask to the distillation unit and steam distill the sample until 25 ml of distillate have been collected in a 100-ml volumetric flask. This 25-ml portion should be collected before dilution, as will be explained later.

B. Development and Measurement of Color

4. Add to the 25-ml distillate 1 ml of Nessler's reagent, make up to the mark, and shake thoroughly to mix well.
5. The color should develop almost immediately, but 5 minutes should be allowed before taking the reading. The reading should, however, be taken before 30 minutes have elapsed.
6. [illegible] filled with water as the reference solution, adjust the colorimeter so that the galvanometer is at zero deflection when the scale reading is zero.
7. Pour out the water, rinse the tube several times with the unknown solution, and then partially fill it with the unknown solution.
8. Measure the transmittancy of the solution by placing the filled tube in the colorimeter and rotating the dial until the galvanometer returns to its zero-deflection position. Record the dial reading.
9. Run a blank in a similar manner except for the omission of an aliquot of the bath, and record the dial reading.
10. Subtract the blank reading from the reading of the unknown to obtain the corrected reading.
11. With this reading, refer to the calibration curve and read off the amount of ammonium in 1 ml of the bath.

Calculations

If the reading obtained for a 1-ml sample of bath was 91 and the blank reading was 3, the corrected reading is 91 − 3 = 88. This reading corresponds to 0.125 milligram of ammonium on the calibration curve. Since a 1-ml sample had been taken for analysis, 0.125 × 1000 = 125 mg/l or 125 ppm is the concentration of ammonium in the bath.

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In the concentration range where Bouguer-Beer's law is obeyed, the need for a calibration curve can be eliminated if the colorimeter has a logarithmic scale. Run an unknown, a standard, and a blank. Correct both the standard and the unknown for the blank. Since the read-

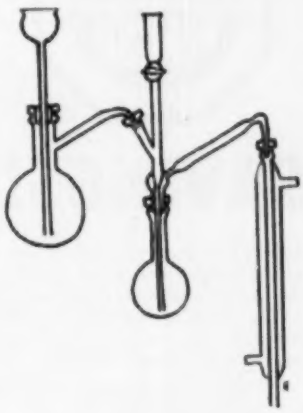

Fig. 2. Micro Kjeldahl distillation apparatus with ground-glass joints

TABLE V. PRECISION OF METHOD

Ammonium Added microgram	Average Reading	Blank	Corrected Reading	Ammonium Recovered microgram	Error per cent
0	3	3			
103	70	3	67	97	−6
103	69	3	66	95	−7
103	71	3	68	98	−5
103	70	3	67	97	−6

TABLE VI. EFFECT OF DILUTION AT TIME OF COLOR DEVELOPMENT ON COLORIMETER READING

Ammonium microgram	Dilution ml	Average Reading
128.8	1	173
128.8	10	94
128.8	25	87
128.8	75	78

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ings for both the standard and the unknown are directly proportional to the concentration of ammonium, the concentration of ammonium in the unknown can be calculated from the following expression:

$$\frac{\text{Concentration of standard}}{\text{Corrected reading of standard}} \times \begin{bmatrix}\text{Corrected}\\ \text{Reading of}\\ \text{unknown}\end{bmatrix} = \begin{bmatrix}\text{Concentration}\\ \text{of}\\ \text{unknown}\end{bmatrix}$$

Discussion

There are several advantages in using steam distillation in the determination of ammonium: (1) the steam provides a stirring action and facilitates the removal of ammonia, (2) it eliminates the need for materials to prevent bumping, (3) the reagents can be used in a more concentrated form, and (4) one can vary the sample size by properly selecting the size of the Kjeldahl flasks.

It was found that the dilution of the distillate when the Nessler reagent is added is a very important factor. Table VI shows the effect of dilution on the intensity of the color formed in four samples, each containing the same amount of ammonium and each subsequently made up to 100-ml final volume.

These results show the necessity for maintaining a constant dilution value for all samples.

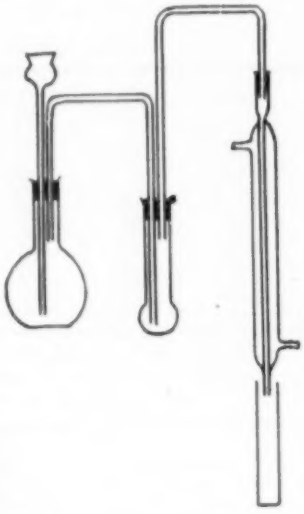

Fig. 3. Micro Kjeldahl distillation apparatus assembled with rubber stoppers which have been boiled in 10 per cent sodium hydroxide solution before use

It was further found that a Kjeldahl unit (Fig. 3) comprised of standard laboratory equipment and rubber stoppers gave reliable results if the rubber stoppers had been boiled in a 10 per cent solution of sodium hydroxide before use.

Stop-and-Go Method

The "Stop-and-Go" procedure for the determination of ammonium in nickel plating baths is the same as that described in the "Recommended Routine Procedure". The solution is collected, and the color is developed in a Nessler tube and compared visually with a series of standards.

The detailed procedure is as follows:

1. Pipette 1 ml nickel plating bath into a micro Kjeldahl flask.
2. Proceed with the procedure and distillation as in the routine procedure and collect 25 ml distillate in a 50-ml Nessler tube.
3. Develop the color by pipetting 1 ml of Nessler's reagent into the tube.
4. Dilute to the mark and shake well.
5. Select the standard which the unknown most closely resembles in color. The amount of ammonium in the unknown is then equal to the amount of ammonium in the standard. The method is accurate to at least 13 ppm of ammonium.

Summary

Ammonium is separated from a nickel plating bath by alkali treatment and steam distillation with a micro Kjeldahl apparatus. The ammonia is treated with Nessler's reagent, and the color developed is measured photometrically with a Klett-Sommerson colorimeter using the No. 42 blue filter purchased with the instrument.

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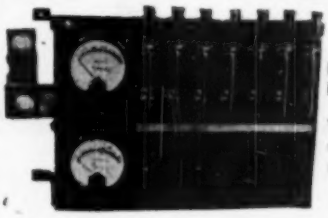

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Cadmium, inch	0.0005	0.0003	0.00015

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Coating	Type D.S.	Type F.S.	Type K.S.	Type Q.S.
Copper plus nickel, inch	0.0020[a]	0.00125	0.00075	0.0004
Final nickel, inch	0.0010	0.0006	0.0004	0.0002
Chromium (if required), inch	0.00001	0.00001	0.00001	0.00001
Resistance to standard salt spray, hours without appreciable corrosion	96	72	48	16

[a]When copper is used in excess of a thickness of 0.0001 inch, its minimum thickness shall be 0.00075 inch.

Nickel-Chromium on Copper and Copper-Base Alloys: B141

Coating	Type F.C.	Type K.C.	Type Q.C.
Nickel, inch	0.0005	0.0003	0.0001
Chromium (if required), inch	0.00001[a]	0.00001	0.00001

[a]Max. thickness should be kept below 0.00005 inch to prevent cracking.

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Nickel-Chromium on Zinc and Zinc-Base Alloys: B142

Coating	Type F.Z.	Type K.Z.	Type Q.Z.
Copper plus nickel, inch	0.00125	0.00075	0.0005*
Copper, inch	0.0004	0.0003	0.0002
Final nickel, inch	0.0005	0.0003	0.0003
Chromium (if required), inch	0.00001	0.00001	0.00001
Resistance to standard salt spray, hours without appreciable corrosion	48	32	16

*Total of 0.0003 inch if alternative of nickel only is used.

Lead Coatings on Steel: B200

Type	Copper Inch	Lead Inch	Salt spray Resistance* hours
E.S.	.....	0.0010	96
EE.S.	0.000013	0.0010	96
M.S.	.....	0.0005	48
MM.S.	0.000013	0.0005	48
P.S.	.....	0.00025	24
PP.S.	0.000013	0.00025	24

*To standard salt spray test in hours without appreciable corrosion.

Chromate Finishes on Zinc: B201

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Book Review

—DR. HAROLD J. READ, *Associate Professor of Metallurgy, Pennsylvania State College*

METAL FINISHING INDUSTRIES GUIDEBOOK AND DIRECTORY, 1948 edition, xii plus 468 pages. Finishing Publications, Inc., 11 West 42nd Street, New York 18, N. Y. Price, $1.50.

The 17th annual edition of this popular handbook continues with the tradition of practical utility established by its predecessors. An impressive array of authors, all of whom are well-known for their accomplishments in the metal finishing field, have contributed articles which are grouped under six main headings, namely, abrasive methods (of surface preparation); cleaning, pickling, and electropolishing; plating solutions; surface treatments; finishing plant engineering; and control and testing. There is also an extensive trade directory which includes a very complete list of sources of a wide variety of supplies and equipment, a list of trade names with a brief description of the item as well as its manufacturer, and a list of manufacturers and their addresses. As in all parts of the book, the subject matter is restricted to the field of metallic surface treatments involving electroplating or immersion operations. Processes such as galvanizing or sherardizing are not covered.

Those who do not have one of the more recent editions of the Guidebook will be favorably impressed with the section on finishing plant engineering. This has grown from a few pages to approximately 100, and contains much of interest to the plater who is renovating an existing shop or planning a new one. The material has been written by experts, and is not simply a compilation of catalog descriptions.

It is not possible to comment individually on the many sections which comprise the whole book. They are, in general, well-written in a concise, clear manner, and are for the most part up-to-the-minute. One is led to wonder, however, why electroplaters have not taken advantage of some of the newer analytical methods. In the volumetric determination of zinc, for instance, internal indicators may be used to replace the troublesome spot plate and external indicator.

Several formulae are given for the electrodeposition of each metal which is ever commercially plated, and while specific recommendations of a formula for a definite problem are not given, there is usually enough supplemental information to allow the reader to make a proper selection for his particular need or equipment.

Many of the sections contain numerous references to the pertinent journal or patent literature, and all of them have been well edited. The printing and proof-reading have been well done. The spiral binding is advantageous in that the book will open and lie flat for any page.

If the practical plater's *shop* library were to be limited to a single volume, it would be difficult to find anything more suitable than the Guidebook. It does not, however, contain any material on the theoretical aspects of metallic surface treatments.

METAL INDUSTRY HANDBOOK AND DIRECTORY, 1948 edition, xvi plus 480 pages. The Louis Cassier Co., Ltd., Dorset House, Stamford Street, London, S.E. 1, England. Free to *Metal Industry* subscribers.

There have been some changes in this handbook with respect to the 1947 edition which was reviewed quite extensively in the November, 1947 issue of THE MONTHLY REVIEW. In line with recent trends in the commercial use of what were formerly rare metals, the properties of all nonferrous metals are now listed in a single section instead of differentiating between "principal" and "rare" metals. Information of an economic nature has been removed from the technical section and gathered together under a new heading "Metal Statistics." All of the official British specifications for nonferrous alloys have been revised, and current A. S. T. M. specifications for the light metal alloys have been added. Many new proprietary alloys are described in the appropriate section. Wherever data and figures published during 1947 are pertinent, appropriate changes have been made. Some material has been dropped so that the additions have only slightly increased the size of the book which is identical in format and binding (paper) with the preceding edition.

It might be well to point out again that while most of the information is generally useful, the data on alloys, all of which are nonferrous, are given only for those of British origin or distributed by British concerns. Such information should, however, be of particular interest at present when British exports are coming into this country in considerable volume.

Once again there are four main sections in the volume: general properties; general data and tables; electroplating, finishing, galvanizing and anodizing; and the directory. The first is by far the largest, although the others are all sufficiently extensive to be very useful. The directory contains much interesting information on societies, institutions, trade associations, etc., as well as listings of manufacturers.

The section on metal finishing has been but slightly changed. Sources of current (mainly with respect to rectifiers), cleaning, solution formulae and operating conditions, notes on cleaning, notes on plating, metal coloring, polishing and finishing, and anodizing are the subjects of the various chapters.

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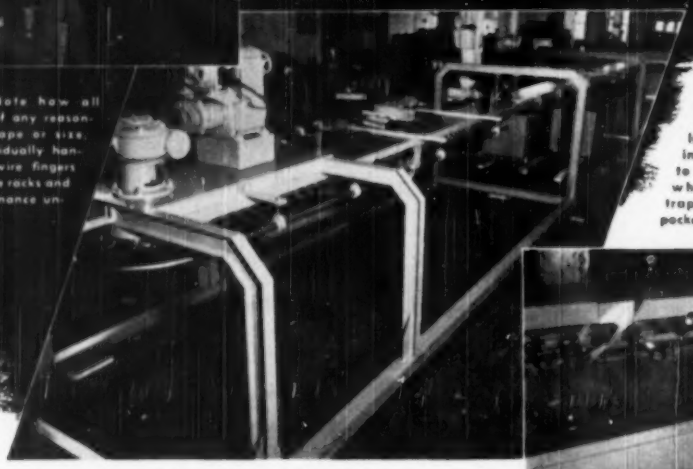

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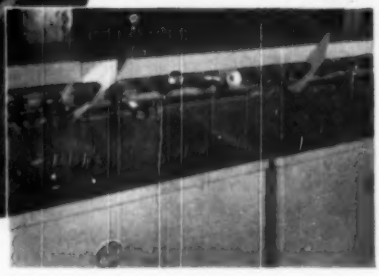

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——readers' questions of general interest——

Q. 41. Would you kindly send us any information you have on protective coating of zinc-plated and buffed steel? We have investigated various "chromate dips," but the buffing removes the protective finish. Also, our past experience with lacquer has been that it dulls the brightness of the buffed zinc.

A. My only personal experience with protective coatings for buffed zinc plate was gained just prior to our entrance into World War II, in connection with work done for the Ford Motor Company which substituted buffed and lacquered zinc plate for nickel-chromium coatings on some automotive parts. As I recall it, the procedure was as follows:

1. The steel was plated in a zinc plating solution containing a considerable amount of copper cyanide in order to harden the plate and make it easier to buff to high luster. 2. Following buffing, the zinc plate was cleaned according to the usual practices in cleaning zinc base die castings, then rinsed thoroughly, and given a bright dip in ½ per cent by volume or less of nitric acid. The bright zinc plate was then immersed in a weak chromic acid or sodium bichromate dip to passivate the surface without discoloring it, rinsed, and dried at a low temperature and with plenty of air motion to retain undamaged the passive film. 3. The buffed and passivated zinc surface was finally lacquered with a clear lacquer made by the Ford organization itself from soy bean oil.

The result, as I remember it, was quite satisfactory, although the luster was not as high as that of chromium plate. I don't believe that the lacquer dulled the finish a great deal, at least not during the early part of its life. Today there are available a large number of synthetics, some of which may prove superior to the standard lacquers.

Several advertisers in Plating supply clear chromate treatments which may prove superior to the dips mentioned here.—GUSTAF SODERBERG.

Q. 42. Can you tell me how to produce a nickel coating with a surface like sand paper?

A. Add a handful of activated carbon to your nickel solution, stir it in well, and proceed to plate in the usual manner.—M. B. DIGGIN.

The questioner, having tried out Mr. Diggin's suggestion, reported complete success.—EDITOR.

Q. 43. In our manufacture of phonograph record stampers we are having trouble both in the copper electroforming, getting a great deal of grain on the back of the plate as well as soft copper, and in the nickel electroplating, with peeling of the plate. Can you help us?

A. Grainy, soft copper is often the result of operating the plating bath at high temperature. Hence the bath temperature should be kept below 105 to 110° F in order to get deposits that are suitable for record manufacture. Addition agents such as molasses (1 pint per 100 gallons) or dextrin in very small amounts are often used to harden the deposits when higher temperatures are used. Care must be taken in their use because an excess will cause the deposits to become brittle.

Nickel peeling from the passivated nickel surface on which it is plated may be the result of high internal stress in the deposits. The causes for this may be organic or metallic contamination of the solution, high chloride content, too low a bath temperature, or too high a current density. If the nickel is peeling from the copper overlay, it may be the result of incomplete activation of the nickel before it is placed in the copper bath. It may also be advisable to have the current on the work when it is immersed in the copper plating solution.—C. STRUYK.

A. A copper solution can be made from 32 oz/gal copper sulfate and 7½ oz/gal sulfuric acid. In order to reduce grain size and minimize "treeing", it is customary to use an addition agent such as one pint of molasses or 4 ounces of glue in each 100 gallons of solution. The temperature of the acid copper solution should be maintained at approximately 90° F and the current density between 70 and 150 asf. If the solution has a tendency to heat, lead coils should be installed for cooling. High temperatures will promote a coarse-grained structure. It is customary to employ agitation in these baths, usually by rotating the disc.

A nickel solution that has been used successfully for this type of work can be prepared from 32 oz/gal nickel sulfate, 4 oz/gal nickel chloride, and 5 oz/gal boric acid. This bath is operated at a temperature of from 70 to 85° F with an electrometric *p*H of 5.0–5.5. The current density should be kept within the limits of 5 to 10 asf. After the nickel solution has been prepared, it is advisable to treat it with ½ to 1 pint of hydrogen peroxide per 100 gallons and warm to around 140° F. It should then be filtered to remove precipitated iron, the *p*H brought to normal, and then either treated with activated carbon and refiltered or passed through a filter having an activated-carbon cake on the cloths. After this treatment, the solution should be electrolyzed for eight to twelve hours on corrugated dummy cathodes at 3 to 5 asf.—M. B. DIGGIN.

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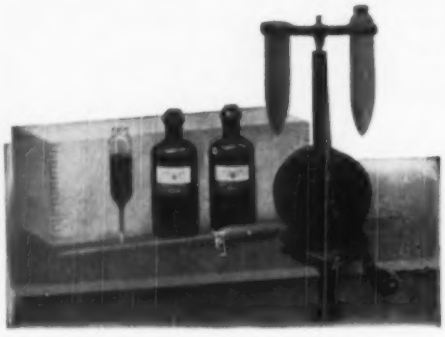

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Article Abstracts

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The Diffusion Behavior of Precious Metal Electroplates. Helmut Buckle. Metallforschung **1,** 47-52 (July-August, 1946); 175–181 (December, 1946).
Describes a new method for application of microhardness testing to determination of the diffusion of plated and base metals into each other. Results for silver plate on aluminum are charted, illustrated, and discussed. A simple and easy way to determine coefficient of diffusion behavior is described. Proposes a new coefficient for the diffusibility of coatings, and proves mathematically that the annealing-time-diffusibility curve is, as a rule, a parabola. The behavior of the metal pairs silver-aluminum, silver-zinc, and silver-calcium was determined. Results are charted and discussed.

Precious-Metal-Plated Electrical Contacts. Ernst Raub. Metallforschung **1,** 71–75 (September, 1946).
Describes and illustrates the mutual diffusion of the coating and the plated metal and the effect of particle transfer by electrolytic action on the plated surface and on the behavior of the contacts. The experiments were conducted on contacts plated with gold, silver, and two gold alloys, containing 7 per cent platinum and 5 per cent nickel, respectively.

Corrosion Resistant Materials in Brass and Copper Pickling. Iron Age **162,** 100–101 (October 7, 1948).
Tables describe four plant corrosion tests for pickling of brass and copper, and four for bright pickling of brass. Using each test, corrosion rates are given for a series of corrosion-resistant metals and alloys.

Barrel Finishing of Aircraft Parts. Joseph Wingate. Metal Finishing **46,** 67–74 (October, 1948).
Shows how, by use of accurate tests and by sticking

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Aluminum Cleaning Methods. Alfred H. Pope. Metal Finishing **46,** 75–80, 125 (October, 1948).
First discusses the problem in general terms, then specific methods (vapor degreasing, solvent cleaning, emulsion cleaning, alkaline cleaners, pickling, and etching), and finally specific problems: cleaning before spot welding, cleaning before electroplating by zinc immersion, treatment prior to anodizing, treatment prior to burnishing, brightening prior to buffing, cleaning before bonderizing, preparation for porcelain enameling, production of a frosted finish, removal of an applied oxide coating, and removal of welding flux. 12 ref.

Evaluation of Pickling Inhibitors from the Standpoint of Hydrogen Embrittlement. I. Acid Pickling of Stainless Steel. C. A. Zapffe and M. E. Haslem. Wire and Wire Products **23,** 933–939 (October, 1948).
By means of a special bend test, the field of commercial pickling inhibitors is surveyed from the standpoint of hydrogen embrittlement incurred during the pickling of stainless steel in sulfuric acid.

Chemical Coatings for Improved Cold-Shaping of Steel. W. Overath. Stahl u. Eisen **68,** No. 13–14, 231–235 (1948); Translation No. 2179 by Henry Brutcher, Altadena, Calif.
Discusses technological importance of chemical coatings, especially metal phosphate coatings, for the cold-shaping of steel. Describes phosphating practices and explains phenomena observed in a variety of cold-shaping operations on the basis of chemical and physical properties of the coatings. Gives data on usefulness in various forming processes.

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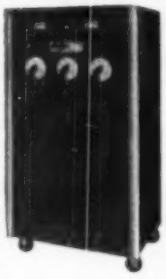

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Patent Abstracts

By GEORGE B. HOGABOOM
Consultant, New Britain, Conn.

Copies of patents may be obtained by writing to Commissioner of Patents, Washington 25, D.C. Price 25 cents each.

No. 2,455,355, December 7, 1948—Electrodeposition of Nickel from an Acid Bath—Henry Brown, assignor to The Udylite Corporation.

CLAIM 1. A bath for electrodepositing bright nickel comprising an aqueous acid solution of a material selected from the group consisting of nickel chloride, nickel sulfate, a mixture of nickel fluoborate and nickel chloride, a mixture of nickel fluoborate and nickel sulfate, and a mixture of nickel sulfate, nickel chloride and nickel fluoborate, said solution having dissolved therein 2-nitrovinyl benzene sulfonic acid in an amount falling within the range of from about 0.3 grams per liter to saturation, said bath having a *p*H falling within a range of from 2 to 6.

2 claims.

References cited: U. S. Patents 2,029,387; 2,191,813. Linick, Metal Finishing 39, 81 (November, 1941). "Modern Electroplating" (1942), pp. 242, 243.

No. 2,455,554, December 7, 1948—Electrodeposition of Copper—Henry Brown, assignor to The Udylite Corporation.

The object of this invention is to decrease the grain size and increase the lustre of the copper deposit without materially impairing the ductility of the plate or decreasing the current density range of the copper plating bath.

I have found that this object can be accomplished by the addition of small concentrations of acetyl cyanamide to the standard acid copper plating baths:

$CuSO_4 \cdot 5H_2O$	150 to 250 grams per liter
H_2SO_4	10 to 75 grams per liter

The following acidic copper plating baths can be used:

A—$CuSO_4 \cdot 5H_2O$	200 grams per liter
H_2SO_4	10 to 25 grams per liter
B—$CuSO_4 \cdot 5H_2O$	150 grams per liter
$(NH_4)_2SO_4$	10 to 50 grams per liter
C—$Cu(BF_4)_2$ (copper fluoborate)	100 to 150 grams per liter
Free HBF_4	5 to 25 grams per liter
D—$Cu(BF_4)_2$	100 to 150 grams per liter
NH_4BF_4	10 to 50 grams per liter
HBF_4	1 to 25 grams per liter

A preferred bath from the standpoint of economy is:

$CuSO_4 \cdot 5H_2O$	150 to 200 grams per liter
H_2SO_4	10 to 25 grams per liter
Acetyl cyanamide	0.1 to 0.5 grams per liter
Temperature	50 to 75° F
Cathode current density	10 to 100 amp/sq. ft.
Agitation	Vigorous

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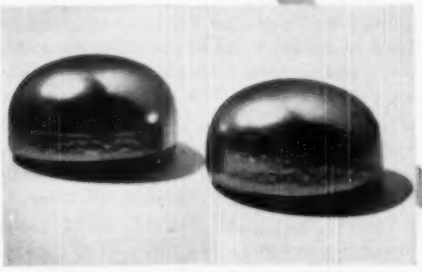

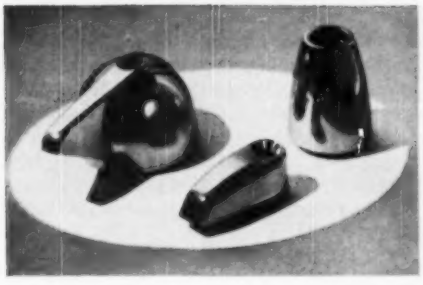

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Claim 1. A bath for electrodepositing bright copper comprising an aqueous acid copper solution comprising essentially a material selected from the group of materials consisting of copper fluoborate, a mixture of copper sulfate, ammonium sulfate and sulfuric acid, a mixture of copper fluoborate and hydrofluoboric acid, and a mixture of copper fluoborate, ammonium fluoborate and hydrofluoboric acid, said aqueous acid copper solution also having dissolved therein acetyl cyanamide in concentration ranging from about 0.1 to 0.7 gram per liter, said bath having a temperature falling within a range of from about 50° F to about 100° F, and containing a greater molar concentration of copper salt than of acid.

6 claims, 4 examples.

References cited: U. S. Patents 2,164,924; 2,374,289; 2,391,289. "Modern Electroplating" (1942), p. 157.

No. 2,457,059-61, December 21, 1948—Method for Bonding a Nickel Electrodeposit to a Nickel Surface—R. C. McQuire, assignor to The International Nickel Company.

The present invention relates to the treatment of a nickel starting sheet or other nickel surface to obtain adherence thereto of a subsequent nickel electroplating and to the product obtained by such treatment.

Claim 1 of No. 2,457,059. A method for obtaining improved bonding of a nickel electrodeposit to a nickel surface which comprises immersing a nickel starting sheet for about 5 minutes without the application of electric current from an external source in an aqueous bath containing about 100 grams per liter of sulfuric acid, about 50 grams per liter of sodium chloride, about 5 grams per liter of copper in the form of copper sulfate and the balance essentially water, maintaining said copper in the cupric state by passing air through said bath, removing said nickel starting sheet from said aqueous bath, rinsing said starting sheet with water, immersing said starting sheet in a nickel electroplating bath and electrodepositing nickel on said nickel starting sheet.

10 claims, 2 examples.

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CLAIM 1 OF No. 2,457,060. A method for obtaining improved bonding of a nickel electrodeposit to an article having a nickel surface which comprises anodically treating said article having said nickel surface for about 5 minutes in an aqueous chloride-bearing bath consisting of about 50 to 200 grams per liter of sulfuric acid, about 50 to about 60 grams per liter of msodiu chloride, copper sulfate in an amount to provide a cupric ion concentration of about 50 grams per liter of cupric ion, and the balance essentially water at a current density of about 15 amperes per square foot; removing said article from said bath; rinsing said article; transferring said article to a nickel electroplating bath; and electrodepositing nickel on the anodically treated nickel surface of said article whereby an improved bonding of nickel electrodeposit to said nickel surface of said article is obtained.

13 claims, 2 examples.

CLAIM 1 OF No. 2,457,061. A method for obtaining improved bonding of a nickel electrodeposit to a nickel surface which comprises anodically treating said article having said nickel surface for about 2 to about 5 minutes in an aqueous acid bath consisting of about 10 to 200 grams per liter of sulfuric acid, copper sulfate in an amount to provide about 0.5 to about 30 grams per liter of cupric ion in said bath and the balance essentially water at current densities of about 10 to about 25 amperes per square foot; and electrodepositing nickel on said anodically treated nickel surface of said article whereby an improved bonding of a nickel electrodeposit to said nickel surface is obtained.

7 claims, 2 examples.

References cited in No. 2,457,059: U. S. Patents 765,371; 1,373,837; 1,417,896; 1,562,711; 1,793,936; 2,001,385; 2,162,739; 2,299,054. Iron Age **146**, 19–20 (September 26, 1940); 32–33 (October 3, 1940).

In 2,457,060: U. S. Patents 694,699; 1,417,896; 1,566,984; 1,793,936; 2,001,385; 2,285,549. Iron Age, *supra*.

In 2,457,061: U. S. Patents 694,699; 1,417,896; 1,793,936; 2,001,385. Iron Age, *supra*.

McKeon's

Zinc-Brite

Throws down carbonates in your zinc solution

Simple

Efficient

Economical

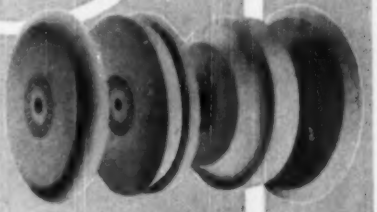
Order on 30 days' approval

Sulphur Products Co. Inc.
Greensburg Pa. 8

USE READER SERVICE CARD; INDICATE A 114.

PARAMOUNT BRAND

FELT WHEELS



Are you finishing articles which require a wheel with a "shaped" or contoured face? Don't forget that felt wheels lend themselves to contouring probably better than any other type of wheel. Don't forget, too, you have nine degrees of hardness to choose from when you buy Bacon Felt Wheels—The Paramount Brand. Ask your supply house for Paramount Brand Felt Polish Wheels.

...TOPS IN "Contourability"

Your Supply House Can Furnish Bacon PARAMOUNT BRAND FELT WHEELS & DISCS

SEND FOR OUR NEW CATALOG

BACON FELT COMPANY

Established 1854

WINCHESTER "America's Oldest Felt Manufacturer"

MASSACHUSETTS Felt Discs If Better

For a Better Finish

use KEW-BEE-KUT

Buffing and Polishing Compounds; Tripoli—White Lime Finish—Greaseless—Italian Pumice, Ground or Lump Form; Hardwood Sawdust (No Dust) All Grades.

Catalog and samples at no charge.

National Sawdust Co., Inc.
64 N. 6th Street, Brooklyn, N. Y.

INDICATE A 152.

USE READER SERVICE CARD; INDICATE A 115.

Automatic Nickel Plating

(Continued from page 149)

in cold water, preferably by means of spray rinses, before the article is taken into the nickel plating bath. Ten-minute electropolishing provides a highly active surface that is both physically and chemically clean and in excellent condition for plating.

As far as we can judge, electropolishing in spite of its high cost of chemicals and current is competitive with the methods used at the present time, which include hand-polishing with its cost for labor and polishing supplies, alkaline cleaning, and acid dipping. We have found no need for replacing an electropolishing bath; it performs well as long as the concentration of the bath constituents are maintained by additions.

The combination of electropolishing and high speed bright nickel and chromium plating supplies a means for low-cost finishing of low carbon steel to a very high luster without any hand operations whatsoever. It does require complete control of the whole cycle, i. e., chemical control of all bath constituents and temperature control of the baths.

REFERENCES CITED

[1]Pinner, W. L. and Kinnaman, R. B., "High Speed Nickel Plating" Monthly Rev. Am. Electroplaters' Soc. **32**, 227-234, (1945).

[2]Richard Schneidewind, Circular No. 3, January, 1930, Department of Engineering Research, University of Michigan, Ann Arbor, Mich.

USE

HARRISON 4A COMPOUNDS

for

BUFFING AND POLISHING

1923–1949

HIGH QUALITY—LOW COST

After 26 years of experience, Harrison & Company, Inc. is producing a complete line of Compounds for some of the leading manufacturers in 27 states and 2 foreign countries. THIS is PROOF of QUALITY and the PRICE is ALWAYS RIGHT. Let our practical representative help you.

HARRISON & COMPANY, INC.
HAVERHILL, MASSACHUSETTS

Waste Disposal Studies

(Continued from page 154)

three categories consistent with the usual classification of plating room wastes. The first paper, relating to cyanide wastes, is nearly completed and will be published during the early part of this year. Later papers will deal with acid- and metal-bearing wastes, and with chromates.

An interim report, dealing with available methods, prepared by Dr. Dodge and his assistant, D. C. Reams, was presented before the 1947 Convention of the Society and has been published in the 1947 Proceedings.

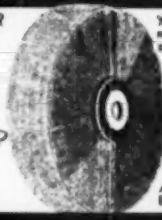
We are currently engaged in laboratory investigations of cyanide-waste treatments. There is a voluminous literature, and several processes are practical under certain conditions. The available methods of analysis are not completely satisfactory, and some time has been spent in developing them further. Extensive studies in this field by the du Pont Company have been made available. The work on cyanides will keep us occupied for at least another year, after which we hope to extend our efforts to other types of plating wastes.

As a part of this project, a questionnaire was submitted to the 255 Sustaining Members who support this and other researches of the Society for information on the types of plating being carried out and for data on stream pollution and waste disposal experiences. We received 106 replies, of which 84 were from firms actually engaged in electroplating work. Some of the information gathered during this survey work was published in a short article which appeared in the November, 1948 issue of PLATING.

This survey indicates the importance of cyanide baths in plating (83 to 89 per cent of all plants reporting), and of nickel (83 per cent), copper (80 per cent), and chromium (73 per cent). The work of the project has been planned in accordance with these results.

The means of disposal used by the 84 plants were tabulated as follows: 61 (73 per cent) to sewers, 25 (30 per cent) to streams, 4 (5 per cent) to dry wells. These figures add up to more than 100 per cent because several plants used more than one means of disposal.

WIRE SCRATCH BRUSHES



You will find in this brush a new construction that will positively eliminate cracked tubs and falling tufts. Our wire is now made with a Double Crimp which will produce amazing results.

Standard Double Crimp Wire ranging from .0025 to .010 is available in BRASS, NICKEL SILVER or STEEL. Brushes range from ½" to 7" in diameter.

A complete Price List and Bulletin 9-26 sent on request

GESSWEIN

PAUL H. GESSWEIN & CO., INC.
35 MAIDEN LANE
NEW YORK 7, N.Y.

USE READER SERVICE CARD; INDICATE A 116.

USE READER SERVICE CARD; INDICATE A 117.

Stainless Steel
PAILS AND STOCK POTS

$12.50* EACH F. O. B. CHICAGO

REGULAR MARKET PRICE $24.85

SAVE 40% AT THIS AMAZING LOW COST!

- Made from 18-gauge solid stainless steel
- Rugged construction insures lifetime service
- Seamless construction, drawn from single piece
- Complies with rigid sanitary regulations
- Easy to handle; easy to clean
- Ideal as a utility pail or for cooking
- Inverted radius bottom*

*Inverted radius bottom is exclusive feature incorporated in to all Stainless Steel pails. Patents pending.

Finish. Polished inside, Electro Glo outside material 18-8-304 pat. pend.

Cut your plating plant equipment cost and step up its efficiency with long-lasting Stainless Steel Pails. Exterior reinforcing lessens long life under rough usage without repair or replacement cost. These pails for the handling of acid and other solutions are meeting the demands of the plating industry and winning the acclaim of both large and small plating shops. Order direct for quick delivery.

Stainless Steel CONTAINER CO.

MANUFACTURERS OF STAINLESS STEEL CONTAINERS FOR THE PACKING HOUSE

141 WEST JACKSON BLVD. • CHICAGO, ILLINOIS

SOLUBAR
RED ROUGE
Cleans Like Magic!

Being extremely soluble there is no need for extra cleaning operations—hand brushing—steaming.

Excellent for lacquer work.

HIGH COLOR—CLEAN WORKING

Gives the work the highest color and a cloudless finish.

1 of the 5 is EXACTLY RIGHT for your finishing operation

SR-100
Dry Finishing

SR-101
Dry Cutting

SR-110
Medium Dry, Cutting

SR-120
Medium Cutting

SR-130
Medium Wet, Cutting

APPROX. 1 LB. WEIGHT

Also available—easy-cleaning Solubar tripoli, lime, white polish, and chrome rouge.

Priced Right—Economical to use.

Send for Samples.

APLEY N. AUSTIN CO.

75 FEDERAL STREET

BOSTON 10, MASSACHUSETTS

PLANT AT PEQUABUCK, CONN.

Equipment and Supplies

E—218. Wood Tanks and Vats of all shapes and sizes—round, rectangular, vertical, horizontal, with or without legs—are manufactured by Wendnagel & Co., 600 W. Cermak Road, Chicago 16, Ill., who also offer engineering help in designing the right tank for each application. The tanks are said to be of tight and accurate construction, properly braced, and made of Tank Grade Lumber.

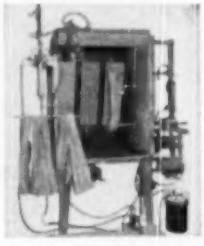
E—219. Non-Electrolytic Oxidation of Aluminum and Its Alloys—Chemoxiding ANC170, a development of the Technical Processes Division of Colonial Alloys Company, Philadelphia 29, Pa., is said to provide most of the common alloys of aluminum, including copper-containing alloys, by simple chemical immersion for a few minutes, with coatings that conform to Air Force-Navy Aeronautical Specification No. AN-C-170 dated March 5, 1948.

Ordinary steel tanks are used. The treating solution is heated and maintained at about 200° F, and the entire operation is claimed to be quite economical. The cycle consists of cleaning and rinsing, treating and rinsing, and finally sealing and rinsing. For further information use Reader Service Card.

E—220. Recoating Worn Abrasive Belts—A new system developed by the J. J. Siefen Company, Detroit, Mich., reduces the high cost of new polishing belts.

By using the Siefen spray equipment and booth to recoat worn-out belts and discs, a new surface, superior even to the original, is said to be produced at a cost less than half the cost of the original belt. Belts and discs may be recoated several times.

The photograph shows a Siefen spray gun for recoating belts with Brushing Nuglu, also a Siefen product. The re-



coating is controlled by means of foot valves, leaving the operator's hands free.

Spraying booths are complete with ventilating fan in the rear, spray gun, pressure tank, drive mechanism, hose, and

PRICED TO SELL!

MOTORS GENERATORS

Reliably Rebuilt

1 YEAR GUARANTEE

6/12 Volts

1—8000/4000 Ampere, H-V-W Synch. M. D. 300 RPM
2—6000/3000 Ampere, B. & O'C. with Chandeysson synch. motor, 450 RPM
2—5000/2500 Ampere, B. & O'C. with Chandeysson synch. motor, 450 RPM
1—5000/2500 Ampere, Columbia, 690 RPM
1—2000/1000 Ampere, H-V-W, 690 RPM
1—1250/625 Ampere, H-V-W, 850 RPM
1—1000/500 Ampere, Chandeysson, 690 RPM
1—1000/500 Ampere, Columbia, 1150 RPM
1—1000/500 Ampere, H-V-W, 1150 RPM
8—125 Ampere Hobart, 6 volts

12/24 Volts

1—1000/500 Ampere, H-V-W synch. M. D. 900 RPM
1—3000/1500 Ampere, Chandeysson Synch. M. D. 400 RPM

10 V. to 60 V. Single Commutator

1—200 Ampere, 11/15 V. Gen. Elec.
1—180 Ampere, 14/18 V. Gen. Elec.
1—200 Ampere, 15 V. Master
1—1000 Ampere, 15 V. Gen. Elec.
1—300 Ampere, 15 V. Star
1—800 Ampere, 22/33 V. Gen. Elec.
3—1500 Ampere, 20 V. Elec. Prods.
1—67 Ampere, 24 V. West.
1—600 Ampere, 24 V. Reliance
1—200 Ampere, 25 V. Star
1—1000 Ampere, 25/35 V. Diehl
1—300 Ampere, 25 V. Star
1—175 Ampere, 25 V. Cr. Wh.
1—500 Ampere, 32 V. Columbia
2—100 Ampere, 30 V. Gen. Elec.
1—200 Ampere, 30 V. West.
2—200 Ampere, 32 V. Gen. Elec.
2—1500 Ampere, 32/40 V. Elec. Prods.
1—1000 Ampere, 33 V. Gen. Elec.
2—200 Ampere, 42 V. Gen. Elec.
3—1500 Ampere, 45 V. Century
1—1500 Ampere, 50 V. Gen. Elec.
2—800 Ampere, 50 V. Gen. Elec.
1—400 Ampere, 50 V. Gen. Elec.
6—1500 Ampere, 50 V. Elec. Prods.
1—1000 Ampere, 60 V. Gen. Elec.

L. J. LAND, Inc.

136 GRAND STREET

NEW YORK 13, N. Y.

Established 1910

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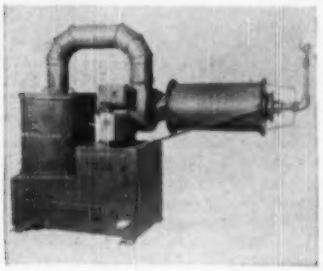
Equipment and Supplies

regulator. The cost of the equipment is claimed to be surprisingly low. For further information, use Reader Service Card.

E—221. Centrifugal Dryer—A centrifugal dryer which is said to dry a basketful of small parts in only 35 seconds has been added to the line of the New Holland Machine Company, New Holland, Pa.

The New Holland Kreider Centrifugal Dryer is operated by one man in a minimum of floor space. Of steel plate construction, it requires 32 x 18 inch space for the standard unit, 44½ x 19½ inch space for the steam-heat unit, and 54 x



22½ inch space for the gas-heating unit. The standard unit is 27 inches from floor to top of basket cage and 30 inches to top of outside cage.

The 12 x 12 inch basket, standard equipment with each dryer, is made of heavy-gauge steel mesh and steel frame, and is rotated at 625 rpm by means of a ½-hp motor. The motor is protected against moisture and can be operated in either direction, a fast-action foot brake stopping the basket almost instantly for reversal. A V-belt drive eliminates all gear noises while a special belt tightener operates constantly while the motor is running. Two large anti-friction ball bearings carry the main spindle shaft. Outside grease fittings permit easy greasing of main spindle shaft. For further information, use Reader Service Card.

E—222. Room-Temperature Strippers for Organic Finishes—Enthone, Inc., 442 Elm Street, Dept. P, New Haven, Conn., has announced the development of two new room temperature strippers for synthetic enamels, named, Stripper S-17 and Stripper S-19.

Stripper S-17 is stated to be a clear, quick-evaporating material used at room temperature for removal of all types of synthetic enamels, including the heavy coatings that accumulate on work holders and hooks. It is particularly recommended for the removal of clear synthetic enamels from highly polished surfaces such as brass, gold plate and silver because it does not tarnish metals; it has no significant odor.

Stripper S-19 is similar to Stripper S-17 in its action and appearance, except that it is slightly ammoniacal and is used in certain special cases for removal of synthetic enamels where Stripper S-17 is not satisfactory. Both strippers are used with water seals to minimize evaporating losses and rinsing is not necessary after their use.

The work to be stripped is merely immersed in the strippers at room temperature for a few seconds to several minutes. The stripper evaporates quickly from the clean surface and the part is ready for refinishing. For further information, use Reader Service Card.

E—223. Acid Copper Bath—An improved acid copper bath which makes possible plating speeds up to 0.001 inch in 10 to 15 minutes has been developed by Dayton Bright Copper Company, 1030 Valley Street, Dayton 4, Ohio.

The Daybrite method, as it is called, employs no cyanide or hot baths and, because it gives off no offensive fumes or odors, requires no ventilation. The smooth, dense deposits are said to have a tendency to fill minor defects in the base metal and to simplify or eliminate buffing operations before the nickel plating cycle, thus reducing polishing time and costs. Daybrite is also claimed to be suited to electroforming operations, particularly in the recording industry, where its inherent fine grain and tensile properties are especially beneficial.

Complete installation service is available through the company and its representatives, insuring correct application of equipment and operating techniques to provide the maximum benefits possible

SPARKLER
horizontal plate
FILTERS

Good Plating Requires Clean Plating Solutions

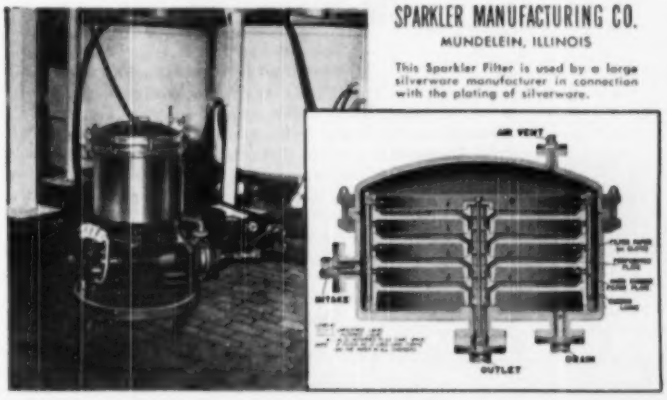
Sparkler Horizontal Plate Filters effectively remove all solids and precipitates from plating solutions—provide positive assurance that solutions are free from undesirable matter.

The horizontal plate principle used by Sparkler makes possible the formation of firm, stable filter cakes that will not slip or crack under intermittent or continuous flow. Flow through the filter is always *with* gravity, and filter aid is floated into position, forming a firm cake of even thickness.

The accompanying photograph shows a typical Sparkler installation in a modern plating plant. Previously, in this plant, silver chloride slurry was shoveled into crocks and laboriously washed by decantation. Now, chloride is mechanically agitated, collected, and washed in the Sparkler filter. Cost of the operation has been sharply reduced and quality of the chloride has been greatly improved.

Filters are pressure-tight and leakproof, and are available in rubber-lined construction, stainless steel, or iron. Capacities from 60 to 10,000 G.P.H.

Our Engineering Service is available for your specific problems.



SPARKLER MANUFACTURING CO.
MUNDELEIN, ILLINOIS

This Sparkler Filter is used by a large silverware manufacturer in connection with the plating of silverware.

Equipment and Supplies

with the improved plating method. For further information, use Reader Service Card.

E—224. Filter Membrane—A new wire-mesh membrane which can be used in any standard Titeflex filter has been developed by Titeflex, Inc., 722 Freylinghuysen Avenue, Newark 5, N. J.

The "Titeflex Wire Mesh Membrane" is a cylinder constructed of Type 316 stainless-steel Dutch-weave wire cloth and supported on the inside by a 1/16-inch thick perforated cylinder with a ring on each end to act as a bearing surface. Mesh of the standard membrane is 20 x 250, but membranes can be furnished in any mesh required. All joints of the membrane are welded.

The new wire mesh membranes can be used with either Filterbestos or diatomaceous earth as filter medium, and they are interchangeable with the porous stone membranes in Titeflex filters. They successfully withstand high pressures and high temperatures and can be used to filter any solution which does not attack Type 316 stainless steel. They can also be used without a filter medium for fine-straining operations.

Due to the very thin wall of the cylinder there is no danger of plugging. For further information, use Reader Service Card.

E—225. Combination Cleaner and Phosphate Coating Compound — A new cleaning and phosphate coating material for use on steel and other ferrous metals to provide a base for paint coating, has been placed on the market by Detrex Corporation, Detroit 32, Mich. This material, known as "Detrex 79", is a yellow, non-corrosive cleaning compound in dust-free powder form. It is used in heated water solutions at low concentrations for the production of a light, crystalline phosphate film on metal parts.

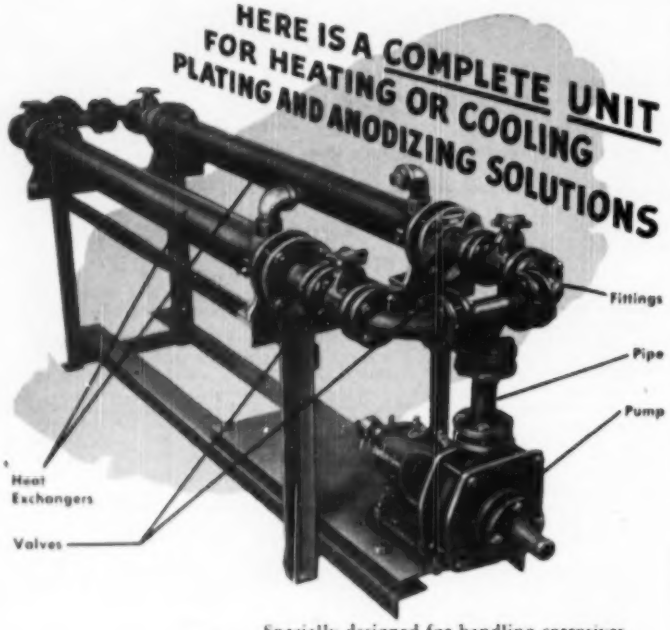
No special equipment is required for the application of "Detrex 79", as the solution may be used in open tanks or continuous washing machines, especially of the spray type—either single or multiple stage. The time required in either mechanical or still tank is one minute spray contact or immersion. There are no fumes or other hazards. The parts come from the process with a clean water-wet surface that dries to a typical uniform blue-gray finish, in either the air or a blow-off stage following the cleaning-coating process. For further information, use Reader Service Card.

E—226. Dip Treatment for Zinc—United Chromium, Incorporated, 51 E. 42nd Street, New York 17, N. Y., has announced the development of Unichrome Dip Compound 95, which is used to produce corrosion-resisting conversion coatings on hot-dipped zinc, plated zinc, and zinc die castings. Depending on the degree to which Compound 95 is diluted, one of the following finishes is produced: (1) on zinc plate, a clear bright finish that looks like chromium, or an olive-drab finish, (2) on zinc die castings, a clear, bluish finish, or an olive-drab one, (3) on hot dipped zinc, a bright spangled finish, or an olive-drab one, (4) on all zinc, a coating which serves as an excellent base for paint, lacquer, or enamel.

The process is said to be especially good for finishing wire goods, small parts, and parts on which it is economically impossible to deposit enough copper, nickel, and chromium to provide the necessary corrosion resistance. Typical of the parts now being given the bright finish are ice skates, refrigerator shelves, screws, hinges, and fan guards. Parts being processed in the olive drab finish include die cast automotive fuel pumps and carburetor bodies. For further information, use Reader Service Card.

E—227. Wet-Primer for Paints and Vinyl Finishes—To eliminate the necessity of having to remove all rust or having the surface perfectly dry before painting, a combination chemical pretreatment and primer for metal, RUST-O-PRIMER is offered by The Wilbur & Williams Company, Greenleaf and Leon Streets, Boston 15, Mass. A vinyl-base, quick-drying, wet-primer, applicable over wet or dry, clean or rusted metal, including steel, aluminum or galvanized, its purpose is to provide a hard, paintable foundation for any type of paint as well as the Acid-Causticbond vinyl-type of finish. For further information, use Reader Service Card.

(*Continued on page 196*)



Specially designed for handling corrosives, this standard unit consists of two heat exchangers with the necessary valves, pipe, fittings and pump — all made of the well-known alloy, Duriron.

Duriron is a high-silicon iron with extreme resistance to corrosion from bright nickel and chrome plating solutions, anodizing solutions and many other corrosives.

Similar units are available with one to nine or more heat exchangers in banks, supported by one frame.

Prints showing typical layouts will be sent on request. Ask for Folder T.

DURCO CORROSION RESISTING ALLOYS & EQUIPMENT

THE DURIRON CO., INC. DAYTON, OHIO

Branch Offices in Principal Cities

DURCO Adv. 49-GM

IRIDITE

on the zinc die cast

KitchenAid MIXER

Grips Paint-- Defies Underfilm Corrosion

Applied by a simple dip . . . without electric current . . . Iridite quickly forms a tough, corrosion-resistant coating on *any* zinc or cadmium surface. This Iridite film provides superior paint adherence by effectively sealing the metal from direct contact with the paint, yet grips the paint securely to block chipping, flaking, peeling.

Use the Iridite treatments, too, as a final finish for extreme corrosion resistance, or as a bright finish that keeps zinc or cadmium plated parts shining, clear of stains.

FREE to users of zinc or cadmium in any form—literature and samples of Iridite. Test it yourself! Or, if you prefer, send samples of your products for free processing.

ALLIED RESEARCH PRODUCTS, INC.

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West Coast Licensee—
L. H. Butcher Co., Los Angeles 23, California

INDICATE A 123.

Trade Literature

L—167. Water-wash Spray Booth—Bulletin 500 of the Binks Manufacturing Company, 3114 Carroll Avenue, Chicago 12, Ill., describes the new Dynaprecipitor booth in which overspray and fumes are pulled through a solid, unbroken curtain of water and treated to five successive thorough scrubbings to remove and collect all paint solids and pigment for disposal or reclamation. Paint particles are said never to reach the exhaust stack to deposit on fan blades and throw them out of balance or form unsightly accumulations on surrounding property. Because of the thorough washing of the fumes and

their dilution with large volumes of air, atmospheric pollution is reduced to a minimum.

There are no nozzles or dead ends to clog or accumulate deposits. Because the water is constantly re-circulated by centrifugal pumps of ample capacity, Dynaprecipitor units are said to be economical. Exhaust air, free from paint, passes through moisture eliminator plates before it reaches the exhaust stack. For your copy, use Reader Service Card.

L—168. Chemical Process Equipment—General Ceramics and Steatite Corporation, Keasbey, N. J., has issued Bulletin No. CHE-R3, graphically illustrating its complete line of chemical process equipment.

Featured in the two-color, 12-page booklet are full specifications for General Ceramics' chemical stoneware, chemical porcelain, and impregnated graphite, known commercially as Ceraware, Cerawite, and Impervite, respectively. The company's complete line of porcelain, an armored chemical stoneware vacuum pump and compressor, and impervious graphite, new additions to General Ceramics' fast-growing line, are clearly illustrated and described in detail. Advantages claimed include uniformity of construction, guaranteed fitting of all units, low shipping costs through consolidation of orders and reduced paper work and accounting. For your copy, use Reader Service Card.

You who use abrasive belts and discs . . . you went for our Red Coat Abrasives like a duck takes to water.

You bought them like hot-cakes . . . so fast that you made us get another plant . . . *just to fabricate* Michigan RED COAT Abrasives.

Why this demand? Because so many of you found out Michigan RED COAT Abrasives CUT BETTER—LAST LONGER.

If *YOU* are one who hasn't tried these famous RED COAT Abrasives—

WRITE FOR FREE SAMPLE

today — Samples that let you SEE and FEEL the difference.

IN EVERY TYPE YOU WANT!

(Supplied in Belts, Discs, Rolls and Sheets—paper or cloth backed—in Silicon Carbide, Aluminum Oxide, Garnet—in full range of standard grit sizes.)

MICHIGAN ABRASIVE CO.
2360 W. Jefferson Ave. Detroit 16, Mich.

Michigan RED COATED ABRASIVES
'The Humidity Controlled Abrasive'

INDICATE A 124.

PERMAG..

—will help in this Year's NEW Cleaning Problems

—What is YOUR Problem in Metal Cleaning?

Below we list a few questions in metal cleaning of surfaces that are often met with, and are not easy to solve satisfactorily without the proper cleaning compound.

DOES ALL BUFFING COMPOUND COME OFF BRASS SURFACES ?

If it does, how long does it take (—maybe much too long)

DOES PLATE ADHERE AS YOU WANT IT TO ON METAL SURFACES ?

If not, there's doubtless something wrong with the cleaner. (PERMAG will correct that.)

DOES VARIETY OF WORK RUN UP YOUR HANDLING COSTS ?

If so, you certainly need PERMAG to cut these down.

Baffling metal cleaning problems can be put on a sound profitable basis by using the right compound as directed. Our trained technical representatives will show you just how we can help you. Write or 'phone. No obligation.

MAGNUSON PRODUCTS CORPORATION

50 Court St. Brooklyn 2, N. Y.

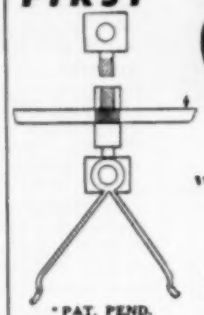
Representatives from coast to coast

Warehouses in principal cities

In Canada
Canadian PERMAG Products Ltd., Montreal-Toronto

USE READER SERVICE CARD; INDICATE A 151.

FIRST STOP



*PAT. PEND.

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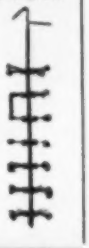
in cross-section with the NARACO replaceable work holder*

THEN LOOK to "REDDY-RACK"

to hold 80% of the small *odd piece parts* in your plating plant.

Now *LISTEN* to "REDDY-RACK" features: the NARACO Removable and Replaceable Work Holder*; rack insulation that will not contaminate your solutions and will stand up in all types of plating and cleaning baths without re-racking between operations; and, "Reddy-Rack" unique all-round design. No plant can afford to be without "Reddy-Rack." Order today by mail from stock for prompt, efficient service.



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EFFICIENCY IS SKIN DEEP

You can't expect top production efficiency when *skin irritations* plague your plant workers—causing *absenteeism* and *slow-downs*. TARBONIS has a long record in hundreds of plants for overcoming and guarding against the recurrence of *skin irritations*.

COMMON SKIN IRRITANTS

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- Plastic Compounds
- Naphtha
- Detergents

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COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

BY _____ DEPT _____

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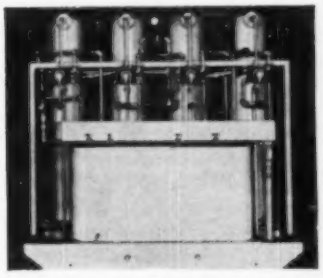
Trade Literature

L—169. Industrial Waste Disposal—As a part of a long-range program to combat pollution of the nation's waterways the Manufacturing Chemists' Association, 608 Woodward Building, Washington 5, D. C., has published a manual to guide plant managements in handling problems of industrial waste pollution. It gives step-by-step procedures for determining the extent to which factory control measures may be necessary and for organizing waste disposal supervision. It recommends that waste disposal be included in new product research and that pollution control be engineered into new and enlarged plants. For existing plants with inadequate facilities for waste handling, the conditions to be met if the program is to be successful with a minimum investment in treating equipment are given. Copies of the eight-page manual at 20 cents each may be had directly from the association.

L—170. "Metals Handbook"—The encyclopedic "Metals Handbook", 1948 edition, is completely revised. More than two-thirds of the 1939 edition has been rewritten and much new material added. It is 40 per cent larger, and important changes have been made in scope, form, and arrangement of subject matter. Authorship has devolved on 68 committees and more than 500 contributors. Major sections are: General, Ferrous Metals, Nonferrous Metals, and Constitution of Alloys; 1444 pages, fully indexed, durably bound, 8½ x 11 inches. Price, $15.00. Send check or cash with order to American Society for Metals, 7303 Euclid Avenue, Cleveland 3, Ohio.

L—171. Demineralizers—The Ion Exchange Department of Industrial Filter and Pump Manufacturing Company, 1621 W. Carroll Avenue, Chicago 12, Ill., offers two bulletins dealing with industrial water demineralizers. One describes a cartridge type unit with a 5-gal/hr flow



rate, consisting of a bracket carrying a cartridge and an electronic conductivity meter for the treated water. The other shows specifications and performance data for two-bed and four-bed units having capacities of up to 1000 gal/hr. For your copies, use Reader Service Card.

L—172. Relief of Skin Irritations—The Tarbonis Company, 4300 Euclid Avenue, Cleveland 3, Ohio, offers a 4-page booklet describing Tarbonis, a salve which is said not only to alleviate skin irritations but help to prevent them. Among industries in which it has proved helpful are the metal finishing, the dry cleaning, and the chemical industries. For your copy, use Reader Service Card.

L—173. Buffing, Polishing and Burring—The Lea Manufacturing Company, Waterbury, Conn., has just published a most comprehensive *practical* book on the subject of finishing metals, plastics, and wood. Covering some 160 magazine-size pages and profusely illustrated and documented, this work is, in effect, an up-to-date textbook for the industry which should be exceptionally useful to those with finishing problems.

The book is divided into three sections: (1) A general discussion of finishing, the Lea Method, terminology, and the finishing characteristics of metals, plastics, and wood. A chapter on the finishing of "electrodeposited metals" is of special interest. (2) Case studies showing how some one hundred and twenty-five companies have improved finishes or reduced finishing costs or both. (3) A detailed discussion of finishing and plating materials and how they should be used, including many items not manufactured by The Lea Manufacturing Company.

This book is for sale from The Lea Manufacturing Company and is priced at $5.00 per copy.

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The MITCHELL-BRADFORD "Package" delivers far more than a range of proven metal finishes, heat treating materials and metal cleaners. It gives you an all-inclusive service for setting up and maintaining the most efficient metal finishing and heat treating operations known to modern chemical engineering.

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BLACK MAGIC for Steel and Iron
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Cleaner 27 Still, soak cleaner
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Cleaner 212 Reverse current cleaner
Cleaner 230 Non-etching Aluminum Cleaner
Cleaner 238 Etching-type Aluminum Cleaner
Cleaner 233 Brass Cleaner (non-oxidizing)
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Special Cleaners — formulated for specific applications

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MILWAUKEE

Site of 1949 A. E. S. Convention

June 27 - 30

Over a century before the English colonies along the East Coast of America united to form a new nation, a French missionary, Father Jacques Marquette, beached his canoe amid the rushes and wild rice at the Milwaukee River's mouth on the shores of Lake Michigan, site of the future leading metropolis of a great and wealthy state.

Louis Joliet, La Salle, the English trader Alexander Henry, La Framboise, Mirandeau, and others followed briefly for more than a century before Jacques Vieau and Solomon Juneau, Milwaukee's first mayor, established a permanent fur trading post here about 1820. Though La Salle had recorded the French version of the Indian word "Millioke" meaning "good lands", for which Milwaukee is named, the early city was divided, like Gaul, in three parts that were known as Juneautown, Kilbourntown, and Walker's Point, after its three founders. Each of the three areas having been independently planned, today's diagonal bridges and haphazard street patterns are a memorial to the rivalry which preceded the incorporation of the three settlements into city wards in 1846.

Construction of the Milwaukee and Rock River Canal in 1842 was the first great impetus to manufacturing growth. Machine shops, flour mills, and woodworking shops sprang up along the canal banks. Harbor improvements begun the next year finally resulted in the half-mile straight cut up the river which opened the way, in 1857, for lake vessels to reach the business section. Now the harbor is open all year and nine lake steamship lines call at Milwaukee regularly, helping six railways to connect the Wisconsin metropolis with the world.

By 1873 the young city had become the world's greatest primary wheat market, though this commerce was outranked in the 80's by brewing, tanning, and meat packing. The Schlitz and Pabst breweries, two of the world's largest, were founded almost a century ago.

Edward Allis, young New York iron molder, in 1847 set up his Milwaukee machine shop from which Allis-Chalmers Corporation, world's largest manufacturers of heavy machinery, has grown. Allis-Chalmers products, with those of the Falk Company and other big

The Host Branch:

The Milwaukee Branch was formed in the first half of 1913, in time to be one of the founding branches of the American Electroplaters' Society when it was constituted on June 1 of the same year.

Through its long history it has been one of the strong branches of the Society, if not one of the largest. One need only recall among the older members the names of Robert Steuernagel, Sr., Pat Sheehan, R. M. Goodsell, J. Geissman, and Dan Wittig to realize that one of the reasons has been the devoted leadership the the Branch has been fortunate to enjoy. Another reason is the old-time German "gemutlichkeit" or conviviality that typifies everything Milwaukean and especially everything which concerns Milwaukee Branch.

That the Branch and its activities have been popular among the members is shown by the many father-and-son memberships that have existed: Jack Geissman and William C., the General Chairman of the Convention; Robert Steuernagel, Sr. and Jr., the latter Convention Finance Chairman; John Miszewski, Sr. and Jr.; Henry Binder and Roman; and Patrick Sheehan and sons, Vincent and Edward T.

Milwaukee Branch has been the host of the Society on two previous occasions, in 1924 and 1938. Both are memorable for different reasons: the first because it inspired the formation of the International Fellowship Club, the organization of supply house representatives which has done so much to make subsequent conventions successful; the second, because it inaugurated the policy of furnishing each member with a copy of the Proceedings and of publishing different material in the Society's monthly journal, and because a new Constitution was adopted which served until 1948.

At this time the Society looks forward to another visit among the friends in Milwaukee. Everything augurs well for an outstanding convention.

Milwaukee machinery plants, have harnessed the water power of Niagara, helped build the Panama Canal, impounded great rivers, mixed the concrete for Hoover Dam, built half the roads in Spain, and fabricated many of America's motorcycle and automobile frames. Bucyrus-Erie Chain Belt, Cutler-Hammer, Evinrude, Fried-Ostermann, Allen Bradley, Ampco Metal, Briggs & Stratton, Globe Steel, Paeschke & Frey, Harley Davidson, and dozens of equally important companies have contributed to these enterprises. Many of these are large users of electroplating.

Meat packers prospered in Milwaukee, even earlier than the brewers. John Plankinton began his career in a tiny butcher shop where Gimbel's is now; his partner, Patrick Cudahy, and Philip Armour were other Milwaukee meat-packing pioneers. Pfister, Vogel, and Trostel were early tanners whose business grew with the packing industry, and whose names are associated with great Milwaukee tanneries today.

When even Federal banks were undergoing financial trouble, the nationally famous Wisconsin Marine and Fire Insurance Company went soundly through all crises. Scotsman founder Alexander Mitchell helped bring the big railroads to town, and his beautiful mansion, Mitchell House on Grand Avenue, which later became the Wisconsin Club, gave Milwaukee the social tradition still maintained in its suburban homes.

Defeat of the intellectual liberals in Germany in 1848 brought to Milwaukee an influx of fine citizens of Germanic origin, who soon comprised the major portion of the population. By their inherent love of theatre, fine music, literature, art, lectures, and good living, they made the 90's the Golden Age of Milwaukee. The "forty-eighters" brought their turnverens, biergartens, and weinstubes to this American Munich, and whole families gathered in large landscaped groves to hear concerts, to dance, and to take part in gymnastics and debates. Martini's coffee shop was a symbol of the charm of Milwaukee's Stammtisch days, recorded by Edna Ferber in her book, *Dawn O'Hara.*

Singing societies founded by the Germans and by the Polish and Italian citizens, who later brought their own operas and music to Milwaukee, have survived in the Milwaukee Musical Society and in the beloved "Music Under the Stars" series which annually brings the world's great musicians to Blatz band shell in Washington Park. Layton Art Gallery and the magnificent Allis collection continue to nourish Milwaukee's love of beauty.

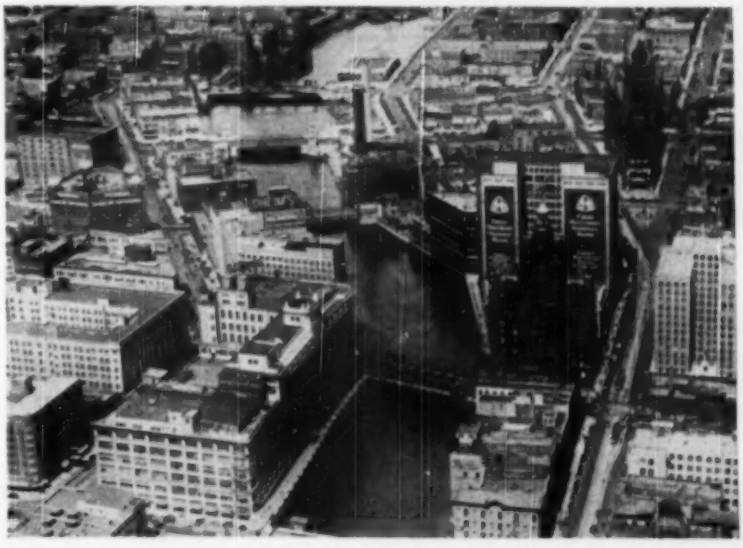
Milwaukee's institutions of higher learning include Marquette University, the University of Wisconsin in Milwaukee, and State Teachers, Milwaukee Downer, Concordia and Mount Mary Colleges. The Milwaukee Vocational School is the largest in the United States, and the City's public and parochial school systems, plus a selection of fine private schools, offer excellent facilities for primary and high school students.

City-owned riparian rights make Milwaukee lake front parks, airports, and harbor facilities unusually good. Seventy-two parks, parkways and squares covering 5,275 acres in Milwaukee County comprise a park system that is nationally famous. Almost all of the lake frontage is bordered by wooded parks and numerous bathing beaches. In addition, there are 163 inland lakes within an hour's drive of the City, affording unusual facilities for fishing, swimming and boating.

The statistics-minded will be interested in the following figures. The city population which in 1850 was 20,061 rose to 285,315 in 1900 and about 633,000 in 1947, when Milwaukee County had about 860,000 inhabitants. In the latter year the value of industrial goods manufactured in the county was $1,478,800,000 and the average factory employment 150,404.

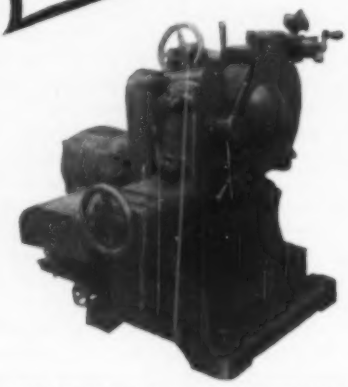
Milwaukee is justly proud of its long record of good government and its careful municipal planning. Unlike most rapidly growing cities Milwaukee has not mortgaged its future but is free from municipal debt, truly a marvelous accomplishment.

View of downtown Milwaukee



Check Your Polishing Costs

with this modern centerless method



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AND WE CAN PROVE IT!

Send us some samples of your work . . . they will be finished and returned with a complete report of methods and time required. . . . It will pay you to check the results with your present costs—No obligation!

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USE READER SERVICE CARD; INDICATE A 131.

For reasons of space, the 1948 Index is being published in the usual style. The extended index prepared by Mr. K. M. Huston will be part of the Decennial Index announced in the January, 1949 issue.

Are you voting this year?

THE A. E. S. IS TRULY a democratic organization. It operates, albeit more simply, very much in the same manner as your national government. Its Officers and Delegates compose your executive and legislative body. They are duty bound to serve you to the best of their ability according to the articles of the Constitution and under the democratic precept of "The Greatest Good for the Greatest Number".

In our National affairs, since it is obviously impossible for all of us to go to Washington to look after our interests, we choose from among us certain persons to represent us, to see that our problems are presented and our interests safeguarded. We refer to these persons as our congressmen, representatives, etc.

For the very same reasons you elect and send to the Convention your chosen spokesmen. You call them Delegates.

What are the duties of your congressman? He is supposed to be on the job to safeguard your interests, to see that your ideas, your problems and your hopes are given a fair hearing, and to fight for those ideals you feel to be for the common good. How can he look after your interests if he isn't on the job? The answer is obvious, he can't. Neither can your Delegate. The remedy is just as obvious.

Your Delegates cast your vote. They are your voice in the affairs of your Society, just as much as your congressman is your voice in the affairs of your Nation. If they shirk their responsibility, by abstention, your voice is stilled.

Scrutiny of the roll calls at the business sessions shows an amazing lack of responsibility on the part of a good many of the Delegates. The erroneous idea has become prevalent that one Delegate is enough to "hold the fort" at each session. Only of necessity can this be true. Certainly every Branch has the right to its complete voice at every session and should see to it that this right is exercised by insisting that every Delegate attending the Convention also attend the business sessions. In that way only can your vote attain full value.

WILLIAM J. NEILL,
Second Vice-President

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ALL SIZES

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All-Purpose CLEANERS

ELECTROPLATING AND POLISHING EQUIPMENT

PLATING RACKS
BUFFS
GENERAL SUPPLIES

• • •

PLATING ROOM SERVICE

Let us help you solve your problems.
Take advantage of our practical experience.

Branch News

COMING EVENTS

DAYTON BRANCH
FOURTH ANNUAL EDUCATIONAL SESSION
AND DINNER-DANCE
Saturday, February 12
in Miami Hotel
Educational Session at 1:30 P. M.

Honorary Chairman, Mr. S. S. Johnston, Weirton Steel Company, Weirton, W. Va. A. E. S. President

r. George W. Jernstedt, Manager, Elec-Mtroplating Projects, Westinghouse Electric Company, East Pittsburgh, Pa., "Periodic Reverse Plating"

Dr. Louis Weisberg, Consultant, New York City and Chairman, A. E. S. Research Committee, "Levelling in Nickel Plating"

Dr. Ralph Schaefer, Director of Research, Cleveland Graphite Bronze Company, Cleveland, Ohio, and Vice-Chairman, A. E. S. Research Committee, "The A. E. S. Research Program"

Dinner-Dance at 6:30 P. M.
Entertainment
CORLISS W. POWELL,
Chairman, Publicity Committee

NEW YORK BRANCH
ANNUAL EDUCATIONAL MEETING
AND BANQUET
Saturday, February 26
in Hotel Statler (formerly Pennsylvania)
Educational Session at 2:00 P. M.

"Precious Metal Plating", by Mr. Edward Rinker, Bart-Messing Corporation, Brooklyn, N. Y.

"Introduction to Metal Evaporation", by Mr. Harold Narcus, Technical Director, Electrochemical Industries, Inc., Leominster, Mass.

"Electropolishing of Stainless Steel" by Mr. Kenneth Huston, Rustless Iron and Steel Corporation

Banquet in the Evening
Floor Show, Dancing

For reservations: Write to Mr. F. J. MacStoker, 25 Princeton Street, Garden City, Long Island, N. Y.
or Detrex Corporation, 350 Fifth Avenue, Room 4113, New York 1, N. Y.
G. SCHORR, *Committee Chairman*

SAGINAW VALLEY BRANCH
CHARTER PRESENTATION
AND EDUCATIONAL MEETING
Wednesday, February 9
in McNiven Hotel, Frankenmuth, Mich.
Dinner at 7:00 P. M.
Presentation of Permanent Charter
A. E. S. Officer Officiating

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 133

Round Table Discussion

Board of Experts:

Dr. M. M. Beckwith, The Harshaw-Chemical Company

Dr. R. B. Saltonstall, The Udylite Corporation

Mr. L. B. Sperry, Doehler-Jarvis Corporation

Mr. Earl Stadel, George L. Nankervis Company

ADELAIDE BRANCH

Owing to illness, the speaker for the September meeting was unable to give his address and a film evening was arranged through the courtesy of the Shell Oil Company. The films were of a particularly fine type and the topics ranged from Balinese Dancing Girls (much appreciated) to the History of Gear Wheels. At the conclusion of the program a stainless steel filter unit, the first of its type to be used in South Australia, was displayed to the members. This filter was designed on the latest American lines and is hoped to be the forerunner of much more modern equipment for use by the electroplating trade.

October was Plant Visit month. Always popular, this evening was no exception and although limited to members only, produced a mustering of over fifty. The object of our inspection was the Finsbury Plant of Pope Products, Ltd., where we gave the enameling shop a quick once over and then devoted our time to the plating shop. This shop is unique in so far as it is the first plating shop here to use bright copper and bright nickel on a mass production basis. (Remember we have not been able to procure any of the proprietory solutions; we have to develop our own.) Members were able to see, for the first time, work received from the polishing shop (itself a model of what a polishing shop should be), racked and taken right through all the stages of cleaning, rinsing, etc., to copper, nickel and chromium. This shop, although small (nickel and copper solutions only 1,200 British gallons each), is capable of processing many thousands of parts a week, all of which are only handled twice at the racking and unracking.

Our speaker for the November meeting was Mr. B. H. S. Day, A. S. A. S. M., and the subject, "Some Ways and Means of Improving Plating Solutions". Mr. Day, in a very informative paper, covered the treatment of solutions by chemical methods, electrolysis, and filtration with activated carbon, and carefully weighed the pros and cons for each type of treatment. He listed the advantages of each treatment, gave practical hints on carrying out the various processes, and warned of the difficulties likely to be encountered. He cited many cases from practical experience, and on the whole his talk was most comprehensive; perhaps a little too long to be digested at one sitting, but a study of the printed notes, when available, should help any plater along the "primrose path".

C. J. Cocks, *Secretary*

BALTIMORE-WASHINGTON BRANCH

The speaker at the December 14 meeting was Dr. William Blum of the National Bureau of Standards. Dr. Blum spoke on the "Interest of the Federal Government in Electroplating", which he showed to be very extensive. He illustrated his talk with some of the interesting questions and problems brought to him by over thirty agencies of the Federal Government. The government's interests in electroplating stem from problems in law enforcement, taxation policies, research, and specifications or service requirements. This extremely interesting talk pointed up the importance of electroplating to this country.

Fielding Ogburn, *Secretary*

BOSTON BRANCH

The Boston Branch met on November 4 in Hotel Statler with President Louis V. Gagnon in the chair. At the business meeting at 7:45 P. M. Masson Glover reported briefly on the 14th Annual Banquet to be held on April 16 and on the preparations for the 1950 Convention. He stated that an exposition could be held only if it can be made a paying proposition for exhibitors. The class in electroplating sponsored by the Massachusetts Extension Service was again announced, and a report of the first session at M. I. T. was received from James Anderson.

At 8:15 P. M. Librarian Glover intro

This Tank HANDLES CHROMIC ACID AT HIGH TEMPERATURES...
and Asks No "TIME OFF"!
It will withstand also nitric and all other inorganic acids, except hydrofluoric — most organic acids, also oils and solvents • The steel shell has ZEROK* resin lining, protected with 4" of acid-proof brick joined with VITREX, a cement immune to temperatures up to 1600° F. — and to any acid concentration.
*ZEROK is proof also against alkalis. May be had too, as a paint, applied with brush or spray.
Tanks and floors, also disposal and neutralization units built of Atlas materials and to Atlas design, are proof against, not merely "resistant to" any given corrosive or group of corrosives, as well as against solvents, steam and high temperatures • Atlas Construction is extra rugged, resists extraordinary mechanical punishment, serves for years without "down time" or maintenance cost.
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Branch News

duced Mr. William L. Jacobs, Sales Engineer with American Air Filter Company, Dust Control Division, of Louisville, Ky., who spoke on "Dust Controls". Mr. Jacobs discussed briefly particle size, hood enclosures, main and branch ducts, fan collectors, and hoppers. This was followed by a selection of slides of industrial installations. New developments in wet and dry systems were explained with some applications. Recirculation systems were also brought into the picture with much detail.

George P. Swift, *Secretary*

BRIDGEPORT BRANCH

Forty-four members and guests attended the monthly meeting on November 5, at which one new member was elected and seven applications for membership were received. Two members were suspended for nonpayment of dues.

The members voted that the dues for 1949–1950 be $8.50.

Following the business session, Librarian A. R. McNeill called upon Mr. Hubert M. Goldman, a Past President of the Branch, who discussed "The Use of Abrasives in Tumbling Operations". In his talk Mr. Goldman described a number of abrasives, such as alundum grit, Danish pebbles, and granite, and compared their action in deburring and in smoothing to produce No. 2 finishes. He emphasized the importance of picking the correct size abrasive and the right compound for the job. In general, large sizes are used for deburring, while the smaller sizes give a burnishing action and a smoother and more lustrous finish. The barrels must not be loaded to capacity but permit the parts to tumble freely. A high water level helps lubricating the parts, and the water may contain antirust compounds or wetting agents or both.

Following adjournment, refreshments were served by the courtesy of E. E. Seeley Company.

J. G. Sterling, *Secretary-Treasurer*

BRIDGEPORT BRANCH

The Open Meeting and Educational Session on November 18 was held in the Electrolux Corporation's auditorium, Old Greenwich, Conn. It began with a fine steak dinner served by the company, during which Mr. William Murray, Works Manager, discussed the production of vacuum cleaners (Electrolux is by far the largest single producer) and Mr. Milton E. Hodges, Plant Engineer and a member of the Branch, offered to answer questions.

Librarian McNeill then introduced Mr. Arthur W. Logozzo, President of Nutmeg Chrome Corporation, Hartford Conn., and A. E. S. First Vice-President, who discussed "Copper, Nickel and Chromium Plating". In his interesting talk Mr. Logozzo dealt with polishing methods; thickness requirements for corrosion resistance; racking, including construction, insulation, and testing for leakage; a new high-efficiency anode (patented); and bright vs. Watts nickel. He also showed pictures illustrating types of racks and anodes. A lively discussion followed.

The host company then provided guides for a tour of inspection of the plant. The hospitality shown is greatly appreciated.

Joseph G. Sterling, *Secretary-Treasurer*

CHICAGO BRANCH

The Social Evening on December 10 drew an attendance of one hundred. Three entertaining movies were shown, after which the crowd gathered around the sandwiches and the refreshments. As usual, the ladies were conspicuous by their absence.

Four applicants were elected to membership.

Arthur G. Bartman, *Correspondent*

CINCINNATI BRANCH

Twenty-one attended the dinner and thirty-six the meeting that followed on November 23 in the Engineering Society Building.

The meeting began with the showing of a movie. The feature of the evening was a talk by A. E. S. Second Vice-President William J. Neill, who described the inner workings of the Society, a presentation that led to a spirited discussion.

H. R. Davis, *Secretary*

COLUMBUS BRANCH

Mr. Evan S. Schmelling, of the Wyandotte Chemical Corp., was the guest

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speaker at the meeting on October 1. His talk gave a much needed insight into the formulation, manufacture and use of different types of modern electrocleaners.

DAYTON BRANCH

Our Christmas Party was highly successful; the eighty members and guests who were present all had a good time. Doc Huff and the committee deserve credit for the fine arrangements.

At our last Board Meeting plans for our Fourth Annual Educational Session and Dinner-Dance were discussed; all indications are that it will be the best of them all. Interesting lectures and very good entertainment are scheduled for February 12 at Hotel Miami.

Five applications for membership were received.

Fred Bauch, *Secretary*

LOUISVILLE BRANCH

By a series of political maneuvers, Albert Steidle was unanimously elected the new president of the Louisville Branch to take the place of Donald Patrick, who has transferred to Indianapolis. Herb Pate remains First Vice-President and Paul De Haven, Second Vice-President.

The largest group yet to assemble for a Louisville Branch meeting gathered to hear Mr. R. F. Ledford of the Hanson-Van Winkle-Munning Company present his paper on "The Application of Cobalt-Nickel Deposits in Plating Electrotypes". Mr. Ledford began by reviewing the literature up to Dr. Brenner's A. E. S. research paper on "Physical Properties of Nickel Deposits", reported in the December issue of Plating. Slides and samples supplemented the text for comparing the present widely used process for preparing electrotypes with the newer cobalt-nickel process.

A lengthy discussion of the features of the process ensued. All in all, this meeting was considered by many to be one of the best of the Louisville Branch presentations.

Stanley J. Beyer,
Secretary-Treasurer

MELBOURNE BRANCH

The 39th Regular Meeting of the Melbourne Branch was held on November 22. Two new members were elected, notice was given that adoption of the new By-Laws would be moved at the January meeting, and a presentation was made to the Secretary.

Business concluded, Librarian Hugh Teague introduced the four guests of the evening, Messrs. Dempster, Malley, Ringwood and Peterson, all of whom were pioneers in the plating trade in Melbourne. Chairman Glen Walker interviewed the old timers on their early experiences and a most interesting discussion ensued. Stories covered not only equipment, supplies, and methods but also many of the personalities met with in the earliest plating shops. An example of these stories was the disposal of cyanide wastes into the gutter outside the shop which caused the annihilation of a mob of thirsty sheep which passed along shortly after.

John J. Dale, *Hon. Secretary*

MILWAUKEE BRANCH

Milwaukee Branch, the host branch for the 1949 Convention, designated its regular meeting on December 3 "Walter Pinner Night" as a mark of appreciation for the many years (15) during which Mr. Pinner has graciously assisted us by presenting an annual paper. The esteem in which he is held by the Branch can be measured by the fact that each librarian starts the list of speakers for the year with Pinner's name.

The dinner meeting was held in the Hotel Ambassador. The first speaker was Congressman Charles Kersten of the 5th Wisconsin District, who discussed "The Communist Movement in Some Labor Unions". Mr. Kersten gave a very interesting resume of the work and findings to date. He was introduced by Evan Schwemmer of the Electro Platers Company.

The meeting was then turned over to Glen Schwemmer, who introduced Mr. Pinner. His talk comprised a review of the fourteen papers he had delivered at Milwaukee Branch meetings. He refreshed our memories on such subjects as the bent cathode test for chromium plating solutions; distribution of plate over surfaces as governed by their shape and the relative position of anodes; the influ-

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Branch News

ence of preliminary polishing treatments of steel on the plate; the development of nickel anodes and the problems involved in their corrosion; the development of the Pinner-Kinnamen high-speed nickel solutions; and finally some novel and interesting information on some work in which he is now engaged concerning the preparation of metals for plating with a view toward increasing corrosion resistance of the final deposit. This new information included a series of slides of variously polished steel surfaces and presented much food for speculation.

At the conclusion of the talk the Branch through Mr. Geissman presented Mr. Pinner with a gavel.

The members of the various Convention Committees were then introduced and a short preview given of the features of the Convention.

The meeting was attended by eighty members and guests, an unusually large turnout.

Vincent Mattacotti

NEWARK BRANCH

Fifty members and guests attended the meeting on December 3, at which two new members joined the Branch.

Dr. H. B. Linford of Columbia University reported on the progress of the A. E. S. Research Committee's work on impurities in plating baths and suggested that any member of the Society who has problems relating to this subject should bring them to the attention of the Project Committee.

Librarian Edward Bowerman then introduced Mr. Harold Narcus of Electrochemical Industries, Inc., Leominster, Mass., who spoke on "Plating on Plastics by the Cupron Process". This process consists of deglazing the plastics in tumbling barrels; cleaning in an alkaline solution; sensitizing with a solution of titanous chloride; activating with chloroplatinic acid; applying a thin copper film in a mixture of Fehling's solution and sulfoxalate-formaldehyde; and adding the desired electrodeposits on top of the film. The advantages that this process offers, especially on small parts, are its economy of chemicals, a higher bonding strength between plastics and electrodeposits, and ease of control. Mr. Narcus backed up his statements by presenting those in attendance with samples of plated buttons that had retained the details of the intricate designs. Numerous lantern slides were shown depicting the machine in which the adhesion of the plated coatings to plastics was tested. It was stated that some of the formulas that are used successfully on glass for the deposition of a thin film of copper fail when they are applied to common plastics. A lively discussion followed the elegant presentation.

S. S. Frey, *Recording Secretary*

NEWARK BRANCH

The Thirty-fifth Annual Educational Session and Banquet was held on December 18 with four hundred members and guests in attendance. Librarian Edwin Bowerman presided over the educational program and introduced the speakers.

Mr. A. W. Logozzo, President of the Nutmeg Chrome Corporation, Hartford, Conn., and First Vice-President of the A. E. S., spoke about decorative plating with bright nickel and chromium. Some of the points he discussed were the use of hydrochloric acid pickles, anodic alkaline cleaners, and good rinses; the use of threaded lead pipes for economical anodes in chromium baths; the building of cheap racks for small parts by driving spring wire staples through holes in bus-bar leads; the use of a high voltage spark coil for testing defective rack coatings; and the preventive methods now employed for minimizing chromic acid fumes. Many questions were asked by the members in the audience and answered by the speaker.

Mr. F. F. Oplinger of E. I. du Pont de Nemours & Company, Wilmington, Del., spoke on his favorite topic, copper plating. He gave an account of the amount of copper consumed annually in this country by the various copper plating baths, cyanide baths being the largest in terms of gallonage. He pointed out the reasons for the introduction of thiocyanates and wetting agents in the high-speed baths and presented details of ranges for bath components and impurities to secure highest efficiency and good deposits.

Dr. E. M. Wise of the International Nickel Company then discussed the plating of precious metals, such as gold, sil-

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ver, and members of the platinum group. He gave a historical background of the plating of gold and some of the other precious metals, with and without the use of electricity, and focused attention on the development of palladium baths, plating of gold alloys, and bonding of deposits to the basis metals through annealing.

We were happy to find many visitors from Boston, Waterbury, New Haven, New York and Hartford branches in the audience.

The Banquet was held in the main ballroom. PAUL OLDAM, Newark's greatest magician actively engaged in plating, acted as the honorary master of ceremonies. Five acts of vaudeville, including a mental wizard, comedy dancing, solo singing, harmonica playing, and gag tossing, were received with ovation. A turkey dinner with all of the trimmings rapidly disappeared before the hearty appetites of those present. The rest of the evening was devoted to dancing to Al Lange and his orchestra, community singing, and social visits.

S. S. FREY, *Recording Secretary*

PHILADELPHIA BRANCH

The regular meeting was held in the Harrison Laboratory, University of Pennsylvania, on December 10 with twenty-one members present. Appointed to the committee to contact Philadelphia public schools regarding the establishment of an electroplating day course were ALBERT HIRSCH, Chairman; DR. SAMUEL HEIMAN, and CHARLES GOSS. Four new members were admitted and three applications for membership received.

It was decided to hold a banquet and educational session on November 19, 1949.

The Question Box elicited the following:
Q. 1. Is there any method other than anodizing that will prevent aluminum table trim from smearing onto a white cloth? *A.* Investigate chemical oxidizing treatments such as "Alumox" and "Alodine."
Q. 2. What is an efficient method of removing buffing compounds from the knu l of brass rings prior to lacquering or plating? *A.* Try a hot soak containing Ivory soap, a wetting agent, and a trace of ammonia prior to the regular cleaner.
Q. 3. Which is the best way to dissolve copper sulfate residue in acid copper plating tank? *A.* The acid concentration is too high and should be diluted by using steam.

I. WM. MARCOVITCH, *Secretary*

PITTSBURGH BRANCH

MR. C. H. SAMPLE of the International Nickel Company gave a very interesting and instructive lecture on "Specifications and Tests of Electrodeposited Coatings" at the meeting on December 9. His colored slides showing the corrosion of different metals gave the listener first-hand information on the type, extent, and appearance of the different kinds of corrosion products found in different atmospheres. These slides should be studied by all interested in electroplating and corrosion protection.

GLADE B. BOWMAN,
Secretary-Treasurer

ST. JOSEPH VALLEY BRANCH

A gratifyingly large crowd of sixty members and guests turned out for the regular dinner meeting in Hotel Elkhart on December 1. Two new members were elected and one student application received.

The speaker of the evening, MR. B. MARTIN, Technical Director of the McGean Chemical Company, spoke on "Bright Nickel Plating". He stressed the importance of frequent testing of plating solutions to accomplish good results in plating and encouraged the use of the "Hull Cell" for a simple and practical test. An unusual interest in the subject was shown by the number of questions asked after the meeting.

MR. CLYDE KELLY, a member of A. E. S. Research Sub-Committee on Finance, gave a brief talk on the progress of the Research Program. He appealed to the Branch for support by securing Sustaining Memberships.

V. E. PETERSON, *Secretary-Treasurer*

SOUTHEASTERN BRANCH

The regular monthly meeting on December 9 under the chairmanship of PRESIDENT M. E. AWTREY began with a discussion of means to augment the mem-

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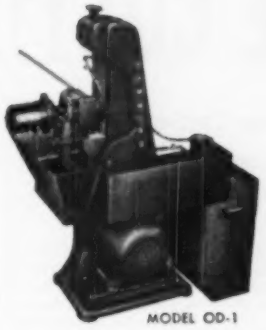

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Branch News

bership, such as reduction of dues and entrance fees. No conclusion was reached and the subject will be taken up again at the next meeting.

The speaker for the evening, Dr. H. L. Kellner of Lea Manufacturing Company, Waterbury, Conn., and Chairman of the Finance Sub-Committee of the A. E. S. Research Committee, gave a very informative and interesting talk about liquid buffing compounds.

Wm. T. Weymouth,
Secretary-Treasurer

SYDNEY BRANCH

The main business at the meeting in November was the election of officers for the year commencing January 1.

President—F. R. Bellenger
First Vice-President—E. J. Wright
Second Vice-President—S. G. Willoughby
Secretary-Treasurer—T. O. Keltz
Librarian—J. H. Lean
Board of Managers—T. H. Wilson, W. H. Milward and D. A. Carpenter

W. H. Milward, B. W. Armstrong and F. H. Bellenger praised the work of retiring President E. J. Wright during the past two years. Mr. Wright, who did a great deal toward founding the Branch, was then elected to honorary membership.

J. R. Godfrey, *Secretary-Treasurer*

SYRACUSE BRANCH

Three applicants were elected to membership at the meeting on November 15 in Hotel Syracuse.

The Branch Research Committee was appointed as follows: G. W. Cavanaugh, Chairman, T. F. Duvall, and L. S. Wood.

Dr. Roy Heath of the Wyandotte Chemicals Corporation spoke on "Cleaning, Pickling, and Preparation of Metals Prior to Plating". His description of the use of radioactive sodium, carbon, phosphorus, and silicon to determine the rinsing properties of silicates and phosphates was very interesting, and the reasons he gave why certain compounds were found in cleaners produced a lively discussion at the conclusion of his talk.

V. P. McConnell, *Secretary*

TOLEDO BRANCH

The Christmas party in Commodore Perry Hotel drew thirty-seven members and seven guests, among them Messrs. Al Scafuri and Farry of Belke Manufacturing Company, A. E. S. Past President M. R. Caldwell and Messrs. De Witt and Fowler of Grand Rapids Branch.

After a short business session Ben Gommersal proceeded to raffle off gifts and give away door prizes. Lawrence Gilmore won the turkey, every person present received a gift. The Entertainment Committee had arranged for refreshments kindly furnished by the Vic Miner Company and Oakite Products, Inc., food, card playing, movies, and a good old-fashioned bull session on plating. There was more discussion of plating problems during this session than during any other meeting that we have held in a long time.

G. H. Bergeman, *Secretary*

TWIN CITY BRANCH

The meeting on December 6, attended by thirty-five persons, opened with a lecture on "Practical Points in Nickel Plating" given by Robert L. Buckley, the Branch's Secretary-Treasurer, and a round table discussion led by Paul Hesse of Union Brass and Metal Manufacturing Company. There has been a definite interest in the new series of informal discussions.

Following the dinner, one new member was introduced and welcomed. President Frank Ireland emphasized the importance of obtaining new members in order that we may continue to offer the many services which we have been giving. He hoped to have at least one hundred members by April 1, the end of the present fiscal year.

Librarian Wray Schorr then introduced Mr. Ray West of Brown Instrument Division of Minneapolis Honeywell Company who spoke about "Temperature Control in the Plating Industry". In addition to his talk, Mr. West showed very interesting slides.

Robert L. Buckley,
Secretary-Treasurer

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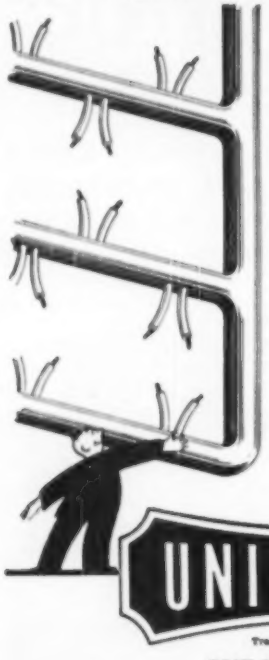

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Membership Report of the A. E. S.

Elections

BALTIMORE-WASHINGTON BRANCH: Carlos A. Luna Z

BOSTON BRANCH: Hubert H. Foley, Charles McNally, Hubert S. O'Neil, John W. Skulski, Frederick Sullivan, Karl I. Tornroos

BRIDGEPORT BRANCH: Alfred Bach, Charles L. Bryan, Dreyton V. Brown, Manuel De La Torre Diaz, William Gault, Walter R. Montgomery, Harvey M. Shepard

CINCINNATI BRANCH: Raymond A. Barry, Harold C. Duggan, Ralph L. Dolan, Christian M. Greiner, W. Wilson Loveless, Edwin Roof, William F. Rust, Harold F. Smith, Robert B. Willett

DETROIT BRANCH: Stanley E. Beauregard, Roger V. Bigham, H. J. Breithart, Hugh M. Brown, George R. Eisenmann, Darrell G. Engle, Gordon T. Forsyth, Delos R. Hay, Webster B. Knight, Jr., James E. Loranger, Gene Lyons, E. William Meyer, Harry P. Osgood, William L. F. Peters, Edwin J. Post

GRAND RAPIDS BRANCH: Raymond N. Bruch, Joseph J. Houston, John Maskal, Coleman Peebles, R. M. Roe

MELBOURNE BRANCH: E. M. McKinnon, C. S. B. Meaker, J. N. Reeves

MONTREAL BRANCH: George R. King

NEWARK BRANCH: William H. Armstrong, Paul E. Kirchartz

PHILADELPHIA BRANCH: Cletus M. Dougherty, William H. Frasch, Joseph H. James, Lawrence M. Watson

PITTSBURGH BRANCH: Chester J. Borowski, Elmer T. Busch, George E. Finney, Jr., Ralph C. Gould, Howard R. Heizenroether, Robert J. Ramsome

ST. JOSEPH VALLEY BRANCH: R. L. Davidson, Robert M. McDowell

SOUTHEASTERN BRANCH: H. A. Blum, John B. Cowen

SPRINGFIELD BRANCH: Philip W. Sanders, Carl Simpson

TWIN CITY BRANCH: John E. Anderson, M. A. Armstrong, R. H. Peterson

WATERBURY BRANCH: O. Cucuette

MEMBER-AT-LARGE: M. Wellard

Reinstatements

BRIDGEPORT BRANCH: A. Pochna

SOUTHEASTERN BRANCH: V. Baran

WATERBURY BRANCH: Septimus Marland, Andrew Perrin, B. W. Snagg

Transfers

Lawrence F. Griffin from Bridgeport

MEMBERSHIP CHART

	Membership May 1, 1948*	New Members	Net Change in Membership	Per Cent Net Change
FIRST GROUP				
TORONTO	143	9	+ 9½	+ 6.6
DETROIT	407	30	+26½	+ 6.5
CLEVELAND	190	14	+12	+ 6.3
BOSTON	163	9	+ 9	+ 5.5
BRIDGEPORT	154	18	+ 6½	+ 4.2
GRAND RAPIDS	148	7	+ 4	+ 2.7
LOS ANGELES	234	1	− 4	− 1.7
PHILADELPHIA	205	12	− 4	− 1.9
NEW YORK	270	11	− 6	− 2.2
PITTSBURGH	149	15	− 7½	− 5.0
WATERBURY	128	5	− 6½	− 5.1
NEWARK	280	9	−18	− 6.4
HARTFORD	150	5	−21	−14.0
CHICAGO	445	17	−73½	−16.5
SECOND GROUP				
SYDNEY	91	24	+18	+19.8
CINCINNATI	80	9	+ 6	+ 7.5
NEW HAVEN	110	8	+ 8	+ 7.3
INDIANAPOLIS	103	6	+ 4½	+ 4.4
ST. LOUIS	103	6	+ 4½	+ 4.4
MILWAUKEE	124	6	+ 3	+ 2.4
DAYTON	90	7	+ 1	+ 1.1
SAN FRANCISCO	77			
TWIN CITY	77	5	− 2	− 2.6
PROV.-ATTLEBORO	117	6	− 8½	− 7.3
ROCHESTER	120	3	− 9½	− 7.9
ST. JOSEPH VALLEY	98	5	− 9½	− 9.7
BUFFALO	94	9	−13½	−14.4
BALTIMORE-WASH.	96	5	−16½	−17.2
THIRD GROUP				
SAGINAW VALLEY	38	9	+16	+42.1
MELBOURNE	68	17	+17	+25.0
LANCASTER	46	9	+ 8	+17.4
ADELAIDE	65	13	+ 9	+13.8
JACKSON-LANSING	64	9	+ 5½	+ 8.6
LOUISVILLE	18	3	+ 1½	+ 8.3
MONTREAL	63	4	+ 2½	+ 4.0
SYRACUSE	66	11	+ 2½	+ 3.8
COLUMBUS	38	7	+ ½	+ 1.3
ROCKFORD	59			
TOLEDO	73	3	− 1	− 1.4
SPRINGFIELD	56	3	− 7	−12.5
SOUTHEASTERN	49	4	−12	−24.5
OTHERS	114	33†	+32½	+28.5
TOTAL A. E. S.	5,263	389	− 7	− 0.1
Active Membership, January 5, 1949			5,256	

*Subject to correction.

†Including 21 in Allentown-Reading Branch.

Membership Report

(Continued from page 195)

Branch; Charles Geldzahler to Chicago Branch; H. E. Nice from Cincinnati Branch; L. D. Ridenour from Cincinnati Branch; William D. Gordon to Cincinnati Branch; Harold W. Faint to Grand Rapids Branch; Thomas Allison from Indianapolis Branch; Donald Patrick from Louisville Branch; Joseph Simon from New York Branch; James Conolly from Pittsburgh Branch

Resignations

CINCINNATI BRANCH: Charles Clarke, Fred W. Vogel

PHILADELPHIA BRANCH: Fred Strang

Suspensions

ADELAIDE BRANCH: G. N. Dixon, L. J. Goble

BALTIMORE-WASHINGTON BRANCH: Robert J. Bachman, James E. Bobsek, Richard G. Evirs, James L. Garst, Jr., Frank H. Gilreath, Leon C. Hasker, Richard J. Norris, W. F. Peterson, Jack M. Santangelo, Grayson B. Smith, Charles W. Stallings, Fred S. Tattersall, J. Wilbur Tidler, Leonard P. Walsh, Samuel R. Warnock

SPRINGFIELD BRANCH: Ralph E. Fales, Francis O'Donnell, Patrick Romano, Clemens C. Tiska, John H. Weir, Arthur Zavarella

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Equipment and Supplies

(Continued from page 180)

E—227. Abrasive Belt Polisher—The Curtis "Straight O-Matic" abrasive belt Polisher and Grinder, Model 600, distributed by W. J. Holtmeier, Inc., 71 W. 23rd Street, New York 10, N. Y., is said to be a fast, compact, versatile unit. Features include rugged welded steel frame, straight-through arrangement which permits manual feeding from coils or by conveyor, belts up to 10 inches wide, feeds variable from 20 to 60 fpm, and screw-adjusted feed rolls for stock up to 1 inch thick. Designed for automatic finishing of flat stock, it can be used individually or in tandem and can be supplied with an inverted head to finish top and bottom of the stock at one pass.

E—222. Paint Can as Pressure Container—Silver King Corporation, 622 Diversey Parkway, Chicago 14, Ill., announces an adaptor that permits paints, lacquers, etc., to be sprayed directly from a 5-gallon container, which then serves as a low-pressure container. The paint can is clamped between two plates of cast aluminum with three hinged rods to which are attached thumb nuts. Parts included on the top plate are a brass regulator valve, standard dial gauge, automatic safety valve, and brass air fittings. A heavy Neoprene paint-resistant gasket prevents paint from escaping around the top edges of the container while the adaptor is in use. For further information, use Reader Service Card.

E—225. Vitreous Enamel for Aluminum Alloys—A new vitreous enamel, suitable for application to 61-S wrought alloy and 43 casting alloys and probably to other alloys judging from outdoor exposure test results, has been announced by the Electrochemicals Department of E. I. du Pont de Nemours & Company, Wilmington 98, Del. The result of six years of research, this development is now ready for large scale evaluation by industry for such uses as on store-front panels, advertising display letters, sanitary ware and accessories, washing machine tubs and agitators, architectural tile, and outdoor furniture, according to the announcement. The enamel is applied to aluminum in about the same manner as ordinary enamel to steel but at considerably lower temperature.

The enameled aluminum is said to be unusually mar-resistant and will not develop unsightly rust if accidentally chipped or cracked. Enameled aluminum sheets made in any convenient length may be shipped to the job and sawed for fitting. For further information, use Reader Service Card.

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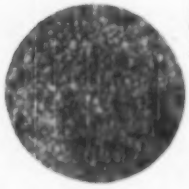
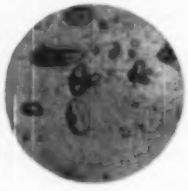


Left: Bonderite coating on metal, after cleaning with Parco Cleaner. Magnification 100x. Note fine, dense, uniform Bonderite coating.



Right: Bonderite coating on metal, after ordinary cleaning. Magnification 100x. Note extreme lack of uniformity in Bonderite coating.

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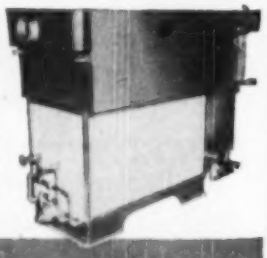

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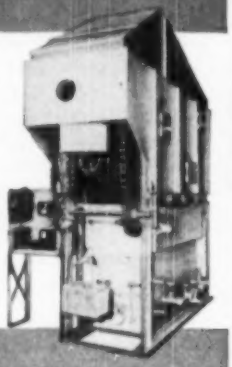

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Plating

February 1, 1949

Dear Reader:--

This month's article on "Wire Screen Plating" is the second in PLATING'S new series of camera visits. Not only does this sequence of interesting views show the actual plating operations, but it also shows the process of manufacturing the wire. It is felt that a general treatment of the actual fabrication of the product gives a better understanding of the nature of the material undergoing plating. We hope to continue this technique.

A word is in order as to what PLATING hopes to accomplish with its new series. It is hoped to bring you articles that will, over a period of time, show--

1. The great diversity of industries in which plating is employed as a part of the manufacturing process.
2. Varied, unusual, and new methods of plating under production conditions.
3. Unique and interesting applications for electroplating (such as the heavy industrial chromium on large parts shown in the January issue).

It is a philosophy of PLATING, and hereby becomes an expressed editorial policy, that the plating and finishing industry should know as much as possible about itself. We hope to establish the picture series as a vehicle that will help to achieve this aim.

Sincerely,

Gustaf Soderberg

Editor

Future Meetings

Saginaw Valley Branch, A. E. S. Charter Presentation and Educational-Dinner Meeting in McNiven Hotel, Frankenmuth, Mich., on February 9 at 7:00 P. M.

Dayton Branch, A. E. S. 4th Annual Educational Session and Dinner-Dance in Miami Hotel on February 12. Educational Session at 1:30 P. M., Dinner at 6:30 P. M.

New York Branch, A. E. S. Annual Educational Meeting and Banquet in Hotel Pennsylvania on February 26. Educational Session at 2:00 P. M. Banquet in the evening.

A. S. T. M. Spring Meeting and Committee Week in Hotel Edgewater Beach, Chicago, on February 28 to March 4.

Boston Branch, A. E. S. 14th Annual Banquet and Technical Session in Hotel Statler on Saturday, April 16.

The Electrochemical Society. Spring Meeting in Benjamin Franklin Hotel, Philadelphia, Pa., on May 4 to 7.

American Electroplaters' Society. Annual Convention in Hotel Schroeder, Milwaukee, Wis., on June 27 to 30, 1949.

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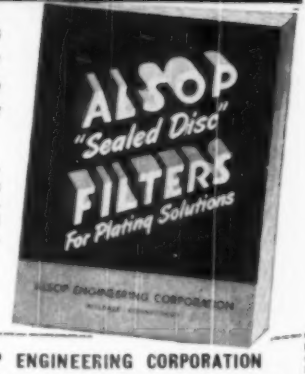

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